U.S. DEPARTMENT OF COMMERCE
National Technical Information Service

PB-266 718

Cost Estimates for Construction of Publicly-Owned Wastewater Treatment Facilities. Volume 2. Summaries of Technical Data Categories I-IV. 1976 Needs Survey

Environmental Protection Agency, Washington, D.C.

10 Feb 77

United States
Environmental Protection
Agency

Office of
Water Program Operations
Washington, D.C. 20460

February 10, 1977
430/9-76-011

EPA

Cost Estimates for Construction of Publicly-owned Wastewater Treatment Facilities

PB 266 718

Summaries of Technical Data

CATEGORIES I-IV
1976 NEEDS SURVEY

REPRODUCED BY
NATIONAL TECHNICAL
INFORMATION SERVICE
U. S. DEPARTMENT OF COMMERCE
SPRINGFIELD, VA. 22161

MCD-48B

Document Number	Title and Content
430/9--76--010 (MCD-48A)	"Cost Estimates for Construction of Publicly-Owned Wastewater Treatment Facilities -- 1976 Needs Survey" This volume contains cost estimates for needed publicly-owned wastewater treatment facilities for eight Needs Categories in each of the States and Territories.
430/9--76--011 (MCD-48B)	"Summaries of Technical Data" (Categories I-IV) This volume consists of summaries of technical data collected in the course of the field work of the Needs Survey in Categories I through IV.
430/9--76--012 (MCD-48C)	"Summary of Technical Data For Combined Sewer Overflow and Stormwater Discharge" This volume contains the technical rationale and supporting technical data used for the estimation of needs in Categories V and VI.

These Reports were prepared under the direction of:

James A. Chamblee, Chief
Needs Assessment Section (WH-547)
Office of Water Program Operations
U.S. Environmental Protection Agency
Washington, D.C. 20460
(202) 426-4443

Copies of these reports are available from the address below. When ordering, please include the title and MCD number.

General Services Administration (8FFS)
Centralized Mailing Lists Services
Bldg. 41, Denver Federal Center
Denver, Colorado 80225

SHEET	EPA 430/9-76-011	

4. Title and Subtitle Cost Estimates for Construction of Publicly-owned Wastewater Treatment Facilities Summaries of Technical Data Categories I-IV MCD-48B	5. Report Date 6.
7. Author(s) James A. Chamblee	8. Performing Organization Rept. No.
9. Performing Organization Name and Address U.S. Environmental Protection Agency OWPO Municipal Construction Division 401 M St., SW Washington, DC 20460	10. Project/Task/Work Unit No. 11. Contract/Grant No.
12. Sponsoring Organization Name and Address Same as Box 9	13. Type of Report & Period Covered Technical Report 1976 14.

15. Supplementary Notes

16. Abstracts

Summary of technical data collected in the course of the field work of the Needs Survey - Categories I-IV.

17. Key Words and Document Analysis. 17a. Descriptors

Technical data from 1976 Needs Survey for Wastewater Treatment Facilities.

17b. Identifiers/Open-Ended Terms

17c. COSATI Field/Group

Reproduced from best available copy.

18. Availability Statement	19. Security Class (This Report) UNCLASSIFIED	21. No. of Pages 87
	20. Security Class (This Page) UNCLASSIFIED	22. Price PCA05 / MF A01

1976 NEEDS SURVEY

COST ESTIMATES FOR CONSTRUCTION OF PUBLICLY-OWNED WASTEWATER TREATMENT FACILITIES

SUMMARIES OF TECHNICAL DATA (CATEGORIES I-IV)

February 10, 1977

TABLE OF CONTENTS

	Page
I. Introduction	I
II. Tables	T-1
III. Figures	F-1
Appendix I - Background and Methodology used for Data Base	AI-1
Appendix II - Survey Form Exhibit A - Form EPA-1 Exhibit B - Code Reference Chart	AII-1

I. INTRODUCTION

A. Purpose and Scope

In compliance with the provisions of the Federal Water Pollution Control Act Amendments of 1972, PL 92-500, Sections 205(A) and 516 (b)(2), the Environmental Protection Agency submitted the cost estimates resulting from the 1976 Needs Survey to Congress on February 10, 1977. This Technical Report is a part of the 1976 Needs Survey report and is a supplement to the Cost Estimate Report to the Congress. It provides summaries of detailed technical and cost data reported in the Survey for Categories I through IV. See Appendix I for a description of the conduct of the 1976 Needs Survey.

Historically, there has been a great deal of sustained interest in the Needs Survey data from all levels of government, quasi-governmental organizations, and industry. Costs as determined in the Survey are primarily of interest because they have historically been used by the Congress to provide relative allocations of construction grant funds among the States. Other interest, however, has been generated by the technical data used in support of the cost data for several reasons:

1. These data have never existed before and permit analysis not possible previously.

2. Unlike some other inventory files, these data are updated biennially and are therefore current.

3. These data represent the best source of information of its type existing today.

Due to this interest, each year EPA receives scores of requests from various sources for data summaries. EPA has never before published the Needs technical data. One of the purposes of this document is to reduce the number of requests for special data summaries by publishing the commonly requested information.

Another reason is the belief that the dissemination of this information will generally aid the participants in the field of municipal wastewater treatment.

Finally, EPA foresees that Needs data can be useful particularly in the facilities planning process, and generally in all aspects of wastewater treatment planning.

The scope of this report is limited to items reported directly to the Needs Survey through the process described in Appendix I. No data items are incorporated from other sources except where noted. In an attempt to improve the quality or type of data presented in this report, EPA welcomes comments and discussion.

B. Categories of Needs

Category I - Secondary Treatment and Best Practicable Wastewater Treatment Technology - This includes costs for facilities which would provide a legally required level of "secondary treatment" or "Best Practicable Wastewater Treatment Technology (BPWTT)." For the purpose of the Survey, BPWTT and Secondary Treatment were to be considered synonymous.

The classification of wastewater treatment plants into Category I in the 1976 Needs Survey was based on plant effluent quality which meets the criteria in the Secondary Treatment Regulations (40 CFR Part 133.102).

Category II - More Stringent Treatment - Costs reported in this Category are for treatment facilities that must achieve more stringent levels of treatment than secondary. This requirement exists where water quality standards require removal of such pollutants as phosphorus, ammonia, nitrates, and organic and toxic substances; and/or where water quality standards require more stringent levels of treatment for BOD and suspended solids than is required by the Secondary Treatment Regulations.

Category IIIA - Infiltration/Inflow Correction - This includes costs for correction of sewer system infiltration/inflow problems. Costs could also be reported for a preliminary analysis of infiltration and inflow for a sewer system and for the more detailed sewer system evaluation survey.

Category IIIB - Sewer System Replacement and/or Major Rehabilitation - Requirements for replacement and/or major rehabilitation of existing sewer systems are reported in this Category. Costs were to be reported if the corrective actions were necessary to the total integrity of the system. Major rehabilitation is replacement of or extensive repair of existing sewers beyond the scope of normal maintenance programs.

Category IVA - New Collectors and Appurtenances - This Category consists of costs for construction of collector sewer systems designed to collect sewage and/or correct violations caused by discharge of untreated wastewater into receiving water, seepage to waters from septic tanks and the like, and/or to comply with Federal, State or local regulations and special actions.

Category IVB - New Interceptors and Appurtenances - This Category consists of costs of new interceptor sewers and pumping stations necessary for the bulk transport of wastewater to treatment facilities.

Category V - Correction of Combined Sewer Overflow - Costs reported for this Category are to prevent periodic bypassing of untreated wastes from combined sewers to an extent necessary to achieve water quality objectives and which are eligible for Federal funding. It does not include treatment and/or control of stormwater.

Category VI - Treatment and/or Control of Stormwater - This includes the costs of abating pollution from stormwater runoff channelled through sewers and other conveyances used only for such runoff. The costs of abating pollution from stormwater channelled through combined sewers which also carry sewage were included in Category V. In the 1974 Needs Survey, Category VI was added so the Survey would provide an estimate of all eligible facility costs, as explicitly required by Public Law 93-243.

The 1976 Needs Survey was conducted on a facility-by-facility basis for Categories I through IV. (Appendix II includes a copy and a description of form EPA-1 used for the Survey.) This document summarizes technical data from Categories I through IV only. Detailed cost data for all Categories and Survey methodology for Categories I through IV are presented in "Cost Estimates for Construction of Publicly-Owned Wastewater Treatment Facilities--1976 Needs Survey" (MCD-48A). Detailed methodology and cost data for Categories V and VI are presented in "Summary of Technical Data For Combined Sewer Overflow and Stormwater Discharge," (MCD-48C).

C. Report Universe

Due to the large number of facilities in the United States, each State was given a choice of two reporting options for facilities in smaller communities:

1. All identified communities and facilities could be reported, i.e., 100 percent reporting. Twenty-nine States and Territories chose this option.

2. All communities within Standard Metropolitan Statistical Areas (SMSA's), and all communities with 1970 populations equal to or greater than 10,000 were reported. For the remaining communities outside SMSA's and with 1970 populations of less than 10,000, the State could choose to randomly select a sample proportion for reporting. The minimum sample allowable was twenty percent. Twenty-seven States chose this second sampling option. The samples used in the 1976 Needs Survey range from twenty to sixty-three percent.

During the 1973 Needs Survey, the sample communities were selected from a computer listing of 1970 Census places outside SMSA's with less than 10,000 population. The lists arranged places within each State in order of population size from large to small. The communities were selected from the lists at an interval based on the intended sample percentage. For example, if the intended sample was 25 percent, the selection interval was one in four; i.e., every fourth community on the list was selected.

For the 1976 Survey, the same sample groups were to be used as in the 1974 Survey. However, the actual percentages of sample populations were checked by comparing the total populations of sample communities to the total populations of all communities in the State. The determination of the actual sample percentage was to ensure that no sample States would fall below a twenty percent sampling level. States which had used a sample in the 1974 Survey had the option to report a 100 percent basis only if the additional needs had previously been identified by the State and there was sufficient information already available to complete a Survey form for each facility.

In most cases, the tables in this Report reflect the expansion of the sample to simulate 100 percent reporting for each State. In other cases, the tables include enumerations for only the facilities actually chosen to represent a percentage sample. Where data have been sample expanded, it is indicated in the table descriptions.

D. Present and Future Needs

Two significant time periods pervade Needs Survey reporting. These are the present, which means January 1, 1976, and the future, which means the year 1990. All needs reported are in present dollars to meet future needs. For populations, however, the best available estimates are for July 1, 1975 and 1990. For Needs purposes, the July 1, 1975 populations are considered to be the current population, and the 1990 populations to be the future population.

E. Metric Measure

All units shown in the technical summaries are in metric units. Where space permits, English units are shown in parentheses beside the metric measure. The following are the most common units used in this report:

1. Flows are reported in thousands of cubic meters per day. Millions of U.S. gallons per day are shown in parentheses.

2. Per capita flows are shown in liters per day. U.S. gallons are shown in parentheses.

3. All tonnages of dry solids are shown in metric tons. Note that metric tons equals short tons x 1.1023.

4. Pipe diameters are shown in centimeters. Pipe lengths are shown in meters.

II. TABLES

A. List of Tables

TABLE	TITLE	EPA-1 ITEM NO.
1	Number of Facilities by Nature of Facility	14b
2	Number and Nature of Wastewater Facilities	14a, d
3	Treatment Populations	16
3a	Populations Served by Less Than Secondary Treatment	16
3b	Populations Served by Secondary Treatment	16
3c	Populations Served by Tertiary Treatment	16
3d	Populations to be Served by Secondary Treatment	16
3e	Populations to be Served by Tertiary Treatment	16
4	Collection Populations	16
5	Numbers of Facilities Needing Collector Sewers by Service-Area Population and Per Capita Sewer Cost	15,16,23
6	Percent of Collector Dollar Needs by Service-Area Population and Cost Per Capita	15,16,23
7	Average Pipe Costs Based on Firm Engineering Estimates or Previous Comparable Construction	17
8	Total Pipe Length Needed by Diameter	17
9	Length and Cost of Pipe Based on 1990 Population to Receive Collection	17
10	Analysis of Liquid Effluent Disposal	18

11	Required I/I Corrective Actions and Basis of Estimate	19
12	Dollar Needs for Required I/I Corrective Actions by Basis of Estimate	19
13	Required Replacement and/or Major Rehabilitation Actions by Basis of Estimate	21
14	Dollar Needs for Replacement and/or Major Rehabilitation by Basis of Estimate	21
15	State Average Flows	24
16	Number and Percent of Treatment Facilities by Flow	24
	Removal Rates and Stream Loading from Facilities Existing in 1976	24
17	All Facilities	
17a	Facilities Providing Less Than Secondary Treatment	
17b	Facilities Providing Secondary Treatment	
17c	Facilities Providing Greater Than Secondary Treatment	
	Removal Rates and Stream Loading from Facilities Projected for 1990	24
18	All Facilities	
18a	Facilities Providing Secondary Treatment	
18b	Facilities Providing Greater Than Secondary Treatment	
19	Number and Flow of Existing Treatment Plants Which Will/Will Not Meet Secondary Requirements	25,26,27

20	Population, Flow, Removal Rates of Existing Treatment Plants which Will Not/Will meet Secondary Requirements	25,26,27
21	Number of Facilities and Reasons for Treatment More Stringent Than Secondary	28
22	Projected Change in Treatment Process Use	29
23	Projected Change in Sludge Unit Process Use	29
24	Present and Projected Daily Sludge Volumes by Sludge Process	29
25	Treatment Process and Sludge Handling Summary	29
26	Survey Sample Characteristics	

B. Explanation of Tables

TABLE 1 Number of Facilities by Nature of Facility

Table 1 lists the number of facilities for each State by description of the nature of facility (Item 14b). Facilities listed under the code "other" refer to outfall sewers and sludge treatment facilities or similar facilities related to wastewater treatment or collection systems but not described by codes 1 thru 5 (see Appendix II). The number of facilities in each type includes the current nature of existing facilities and the proposed nature of future facilities. Data in this table are sample expanded.

For the Needs Survey, combined sewers are defined as sewers which carry both storm and sanitary wastewaters. Separate sewers carry storm and sanitary wastes in separate pipes.

TABLE 2 Number and Nature of Wastewater Facilities

Table 2 shows the total number of facilities, both existing and proposed, by type and the nature of projected change. One change is recorded for each facility. Since most facilities include both treatment plants and sewer systems, the sum of the number of treatment plants and sewer systems exceeds the total number of facilities reported in the Needs Survey. Data in this table are sample expanded.

TABLE 3 Treatment Populations

TABLE 4 Collection Populations

Two time periods are used in the Needs Survey for population purposes. The first of these is the present, defined as the July 1975 population of the States as calculated by the Bureau of Census in Publication P-25 (No. 615); the second is the future or projected population, based, as in past Surveys, on the Census Series I-E population projections for 1990. States presenting evidence which showed, through State conducted censuses or other means, that the 1990 population projections were too low, were allowed to increase the 1990 ceilings used in the Survey.

Table 3 presents a summary compilation of treatment populations by State. The table shows the present and 1990 projected resident and non-resident populations including those receiving or not receiving treatment services. The table contains the EPA approved 1990 ceiling populations.

Similarly, Table 4 present the corresponding data for collection populations.

In both of these tables, there occurs some double counting of populations due to the nature of the organization of wastewater authorities. In many instances, the community sewer system is under a different authority than is the treatment plant(s). As a result, two Needs Survey forms were completed. In theory, the sewer authority would report no treatment population, and the treatment authority no collection population. In practice, however, this was sometimes forgotten. In addition, the above example is a very simple one. Most treatment authorities control at least some sewers, and many sewer authorities treat sludge. Also, many treatment plants discharge their effluent to another more advanced treatment plant. All this results in some double counting of treatment and collection populations in the Needs Survey.

Tables 3a thru 3e show populations served (present) and to be served (1990), by level of treatment. Also included in the tables are percentage comparisons of the present and projected resident populations receiving treatment services, divided by the total resident populations receiving and not receiving treatment services.

The totals presented in the tables have been extrapolated from the sample where less than a 100 percent sample was used in the 1976 Needs Survey. The totals do not necessarily include all the people that reside or are projected to reside in a given State, since some areas of a State may be outside of identified service areas. Also, it must be noted that the total collection population for a given State may not be equal to the treatment population because service areas sometimes cross State boundaries and because sewer systems sometimes discharge to other sewer systems, causing some double counting of populations.

Lastly, note that non-resident populations have been listed separately. Non-residents include transients, commuters, workers, vacationers, and other persons who must be served by local systems even though they maintain no local residence. Non-resident population does not include any form of "population equivalent" based on industrial and/or commercial flows. Non-residents are a serious consideration in a few areas of the country; Florida and the District of Columbia are good examples.

TABLE 5 Numbers of Facilities Needing Collector Sewers by Service-Area Population and Per Capita Sewer Costs

TABLE 6 Percent of Collector Dollar Needs by Service-Area Population and Costs Per Capita

Tables 5 and 6 show the distribution of needed collector sewer projects and Category IVA needs, respectively, by service-area population and collector sewer costs per capita. Table 5 shows the number of facilities requiring collector sewers, while Table 6 shows the distribution of needs dollars by percent.

The projects are distributed by service-area population which is based on the total present resident population receiving and not receiving collection (EPA-1 Items 16(3)(a) added to 16 (4)(a)).

The collector sewer costs per capita are based on the eligible resident population which need collection services.

TABLE 7 Average Pipe Costs Based on Firm Engineering Estimates or Previous Comparable Construction

Table 7 presents the cost per meter for pipes of various diameter by State. The costs selected were those based on firm estimates, usually bid data or plans and specifications, and previous construction costs comparable to local construction conditions (Basis of Estimate codes 4 and 5).

Some anomalies occur in the data presented in this table due to the small number of data points in some States, particularly Alaska and Illinois. In addition, some States had no data at all in this Category.

TABLE 8 Total Pipe Length Needed by Diameter

Table 8 shows, by State, the total length of pipe needed in various diameter groups. The unit of length is in meters and the unit of pipe diameter is in centimeters.

TABLE 9 Length and Cost of Pipe Based on 1990 Population to Receive Collection

Table 9 shows for each State the total length by type, the per capita length and the cost per meter of new sewers. Per capita values are based on the 1990 population receiving collection. Data in this table are sample expanded.

TABLE 10 Analysis of Liquid Effluent Disposal

Table 10 shows the numbers and the projected changes for the various possible liquid effluent disposal methods. Since some facilities utilize more than one disposal method, the sum of the numbers may not equal the total number of facilities reported in the Needs Survey.

Two disposal methods which were not anticipated at the start of the Needs Survey, but which make up the bulk of the responses under "other," are irrigation and discharge to another treatment plant.

In addition, the data presented includes separate sewer systems which discharge to other treatment or sewer systems. Data in this table are sample expanded.

TABLE 11 Required I/I Corrective Actions and Basis of Estimate

TABLE 12 Dollar Needs for Required I/I Corrective Actions by Basis of Estimate

Tables 11 and 12 show the number of facilities reporting infiltration/inflow needs and the dollar amounts required, respectively, by basis of cost estimate. It was not necessary for respondents to provide a basis of estimate when reporting costs for I/I analysis, resulting in a response of "none given." Data in these tables are sample expanded.

TABLE 13 Required Replacement and/or Major Rehabilitation Actions by Basis of Estimate

TABLE 14 Dollar Needs for Replacement and/or Major Rehabilitation by Basis of Estimate

Tables 13 and 14 present Category IIIB needs by numbers of facilities and dollar values, respectively. These tables show that needs based on completed and preliminary engineering estimates represent a majority of all Category IIIB needs expressed in both tables. Data in these tables are sample expanded.

TABLE 15 State Average Flows

Present and projected flows by State are presented in Table 15, along with the percent increases anticipated between now and 1990. Industrial components and per capita flows are included.

Total flow includes domestic, commercial, industrial, and I/I flows. Per capita flows are computed by dividing the total flow minus industrial flow by the total resident and non-resident treatment populations. Data in this table are sample expanded.

TABLE 16 Number and Percent of Treatment Facilities by Flow

Table 16 presents the numbers of existing treatment plants for each State by flow range. The percentage of the plants in a given State within each range is also shown.

TABLE 17 Removal Rates and Stream Loading from Facilities Existing in 1976

TABLE 18 Removal Rates and Stream Loading from Facilities Projected for 1990

The following parameters were used in these tables to define treatment levels:

1. Less than secondary treatment substantially removes all floating or settleable solids. It does not, however, exceed 84 percent removal.

2. Secondary treatment removes virtually all floating and settleable solids and approximately 84-89% of both five-day BOD and suspended solids or a specification of effluent loadings of 30/30 for five-day BOD and suspended solids. In this process, some phosphorus and nitrogen pollutants are also removed, but these are not included in the design removal. They are, however, shown in the secondary treatment tables.

3. Tertiary treatment removes a high percentage of suspended solids and also includes removal of nutrients such as phosphorus and nitrogen.

A summary compilation of significant pollution parameters, by State, is contained in Tables 17 thru 18b. Included are the total existing influent and effluent loadings of five-day BOD, suspended solids, phosphorus, ammonia, nitrogen, and other reported constituents. Also included in the tables are the currently reported removal rates of five-day BOD and suspended solids. Data in these tables are sample expanded.

Table 17 contains data from all existing facilities; Table 17a, facilities providing less than secondary treatment; Table 17b, facilities providing secondary treatment; Table 17c, facilities providing greater than secondary treatment.

Tables 18 thru 18b contain projected removal rates and stream loading for facilities projected to be in operation in 1990.

Total loading quantities given in the tables are the existing or projected loading data, where available, for facilities that are projected to require limitations for the indicated parameters. Totals for any particular parameter include data for only those facilities for which effluent limitations are projected for that parameter. For example, the totals for phosphorus loading include data only for those facilities that are projected to be phosphorus limited, and do not include phosphorus loading data for other facilities. Furthermore, because existing loading data or projected influent data was unavailable for some facilities at the time of the Survey, the tabulated quantities do not, in every case, include loading data for all facilities for which effluent limitations are projected. It should be noted that all loadings are given in metric tons per day of dry weight.

TABLE 19 Number and Flow of Existing Treatment Plants which Will/Will Not Meet Secondary Requirements

TABLE 20 Population, Flow, Removal Rates of Existing Treatment Plants Which Will Not/Will Meet Secondary Requirements

TABLE 21 Number of Facilities and Reasons for Treatment More Stringent than Secondary

PL 92-500 requires that all States meet secondary treatment levels or some more stringent level required by approved water quality standards by July 1, 1977. Items 25, 26, 27 and 28 on EPA-1 deal with the compliance of this regulation. Table 19 indicates the responses received to these items by number and flow for each State. These items show the facilities attaining secondary treatment now and by July 1, 1977 and the facilities whose requirements are greater than secondary.

Table 20 summarizes the responses to EPA-1 Items 25, 26 and 27 by showing the population, flow and Item 27 responses for those facilities which will achieve secondary treatment by July 1, 1977. For those not achieving secondary treatment by 1977, the flow, population and combined five-day BOD and suspended solids removal rates are included. Populations shown are the current populations served by the facility.

Table 21 presents the reasons for treatment level requirements being more stringent than secondary treatment (Item 28). Data in these tables are sample expanded.

TABLE 22 Projected Change in Treatment Process Use

TABLE 23 Projected Change in Sludge Unit Process Use

Table 22 gives, for each treatment process, the number of facilities and associated flows by projected change under three headings: now in use, under construction, and required but not yet funded. Under the third heading, the totals include only those facilities for which the specific processes were identified in completed or on-going facility plans or other engineering studies. In cases where required treatment levels indicated that additional processes probably would be needed, but no planning studies were available to identify the specific process, the additional treatment was coded as "other treatment."

Table 23 shows the same data items for sludge handling unit processes. Data in these tables are sample expanded.

TABLE 24 Present and Projected Daily Sludge Volumes by Sludge Process

Table 24 presents the nationwide volumes of sludge currently reported and projected for 1990. The tabulated values were computed from the present and projected suspended solids concentration reductions, flow data, and the indicated sludge unit processes for each facility. Sludge volumes are given in metric tons per day of dry weight. Data in this table are sample expanded.

TABLE 25 Treatment Process and Sludge Handling Summary

Table 25 gives the total number of facilities and their corresponding flows, by treatment and sludge handling process, under three headings: now in use, under construction, and required but not yet funded.

Under the third heading, the totals include only those facilities for which the specific processes were identified in completed or on-going facility plans or other engineering studies. In cases where required treatment levels indicated that additional processes probably would be needed, but no planning studies were available to identify the specific processes, additional treatment was coded as "other treatment." Data in this table are sample expanded.

TABLE 26 Survey Sample Characteristics

This table shows the characteristics of the sampling techniques used to estimate needs outside of SMSA's and in places of less than 10,000 population. See Section IC for a description of how samples were selected.

1976 NEEDS SURVEY

FEBRUARY 10, 1977
TABLE 1

NUMBER OF FACILITIES BY NATURE OF FACILITY

	TOTAL	COMPLETE WASTEWATER TREATMENT SYSTEM WITH COMBINED SEWERS (CODE 1)	COMPLETE WASTEWATER TREATMENT SYSTEM WITH SEPARATE SEWERS (CODE 2)	SEPARATE TREATMENT PLANTS (CODE 3)	COLLECTION SYSTEMS WITH SEPARATE SEWERS (CODE 4)	COLLECTION SYSTEMS WITH COMBINED SEWERS (CODE 5)	OTHER (CODE 6)
ALABAMA	415	0	302	8	45	0	59
ALASKA	126	6	119	0	0	0	1
ARIZONA	188	3	157	3	15	0	2
ARKANSAS	437	5	423	0	8	0	0
CALIFORNIA	1,050	31	756	14	205	0	44
COLORADO	221	24	160	3	33	0	1
CONNECTICUT	150	41	74	0	32	2	1
DELAWARE	45	7	23	0	13	1	1
DIST. OF COLUM.	1	0	1	0	0	0	0
FLORIDA	503	3	323	0	69	0	108
GEORGIA	610	9	583	0	81	0	135
HAWAII	55	1	54	0	0	0	0
IDAHO	205	6	85	0	16	1	97
ILLINOIS	1,491	989	116	14	175	76	121
INDIANA	537	315	166	0	54	2	0
IOWA	1,120	106	992	0	19	2	1
KANSAS	434	13	412	0	5	1	2
KENTUCKY	372	20	307	1	37	7	0
LOUISIANA	374	2	352	1	18	0	1
MAINE	237	28	102	6	72	17	12
MARYLAND	352	12	276	6	32	4	24
MASSACHUSETTS	251	26	176	4	104	13	8
MICHIGAN	780	291	94	8	176	49	165
MINNESOTA	756	492	88	16	146	3	11
MISSISSIPPI	227	6	208	0	2	5	6
MISSOURI	826	30	738	2	56	0	0
MONTANA	148	38	97	0	10	0	0
NEBRASKA	329	24	297	0	4	0	2
NEVADA	85	0	65	2	15	0	3
NEW HAMPSHIRE	160	32	87	2	42	0	7
NEW JERSEY	554	21	214	19	249	17	34
NEW MEXICO	113	0	101	0	11	0	1
NEW YORK	2,145	82	882	49	581	24	527
NORTH CAROLINA	561	0	406	4	106	0	43
NORTH DAKOTA	357	87	270	0	0	0	0
OHIO	990	483	360	4	139	2	1
OKLAHOMA	456	1	445	2	7	0	0
OREGON	152	33	73	7	10	1	27
PENNSYLVANIA	1,891	157	863	52	692	107	17
RHODE ISLAND	34	11	11	0	6	5	1
SOUTH CAROLINA	455	2	369	15	35	0	34
SOUTH DAKOTA	147	18	125	0	0	0	3
TENNESSEE	381	3	332	5	35	0	6
TEXAS	1,132	10	991	37	138	0	3
UTAH	156	2	110	4	40	0	0
VERMONT	116	27	69	0	9	11	0
VIRGINIA	785	19	600	25	127	2	12
WASHINGTON	257	51	104	5	63	4	30
WEST VIRGINIA	611	59	481	2	66	2	1
WISCONSIN	986	119	481	9	185	0	112
WYOMING	97	11	75	0	0	0	9
AMERICAN SAMOA	6	1	5	0	0	0	0
GUAM	7	0	7	0	0	0	0
PUERTO RICO	34	3	31	0	0	0	0
PAC. TR. TERR.	39	0	39	0	0	0	0
VIRGIN ISLANDS	4	0	4	0	0	0	0
U.S. TOTALS	25,069	3,763	14,947	330	3,981	368	1,677

FEBRUARY 18, 1977
TABLE 2

1976 NEEDS SURVEY

NUMBER AND NATURE OF WASTEWATER FACILITIES

UNITED STATES TOTALS

	NUMBER OF FACILITIES				NATURE OF PROJECTED CHANGE							
	NUMBER OF FACILITIES	TREATMENT PLANTS	SEWER SYSTEMS	OTHER	ENLARGE	UPGRADE	ENLARGE AND UPGRADE	NEW CONST.	REPLACE	ABANDON	NO CHANGE	OTHER
EXISTING	16,895	13,220	15,519	1,134	2,176	2,589	4,255	330	1,376	597	4,294	1,273
PLANNED	8,187	5,820	7,541	542	300	37	41	6,821	4	18	661	383
TOTALS	25,082	19,041	23,061	1,677	2,477	2,626	4,297	7,151	1,380	615	4,955	1,576

1976 NEEDS SURVEY

FEBRUARY 10, 1977
TABLE 2

TREATMENT POPULATIONS
PRESENT, PROJECTED, RESIDENT & NONRESIDENT
(IN THOUSANDS)

STATE	1990 CEILING POPULATION	****** RECEIVING TREATMENT ****** 1975 RES.	1975 NONRES.	1990 RES.	1990 NONRES.	*** NOT RECEIVING TREATMENT *** 1975 RES.	1975 NONRES.	1990 RES.	1990 NONRES.	PERCENT SERVED 1975	1990
ALABAMA	3,850	1,938	113	3,442	296	399	0	233	0	53.6	89.4
ALASKA	408	184	4	408	14	13	0	0	0	92.3	100.0
ARIZONA	3,384	1,657	128	2,632	217	98	0	18	0	74.5	77.8
ARKANSAS	2,225	1,013	2	1,979	9	184	0	0	0	47.9	89.9
CALIFORNIA	26,601	17,737	1,114	24,019	2,018	1,215	6	61	0	83.7	92.2
COLORADO	3,400	2,059	147	3,489	476	12	0	1	0	81.3	100.0
CONNECTICUT	3,946	1,968	34	3,384	98	633	0	455	0	63.6	85.8
DELAWARE	793	114	357	654	785	44	40	12	21	19.8	32.1
DIST. OF COLUM.	784	758	1,142	783	1,483	0	0	0	0	100.0	100.0
FLORIDA	11,728	4,285	715	10,988	1,893	1,258	0	186	0	81.3	93.5
GEORGIA	5,667	2,987	189	5,196	342	270	0	11	0	80.6	99.1
HAWAII	1,132	199	18	978	287	117	18	18	0	23.1	86.5
IDAHO	900	321	3	855	53	71	0	0	0	39.2	72.8
ILLINOIS	13,177	9,827	583	13,177	698	238	0	58	0	88.2	100.0
INDIANA	6,433	3,217	554	5,597	896	482	0	45	0	80.6	87.9
IOWA	3,053	2,201	100	2,985	194	77	0	0	0	76.7	95.2
KANSAS	2,509	1,748	1	2,398	89	131	2	0	0	77.1	95.3
KENTUCKY	3,741	1,203	55	3,017	144	563	0	62	0	38.4	89.7
LOUISIANA	4,159	2,447	26	3,896	130	136	37	0	0	84.6	93.7
MAINE	1,142	377	73	887	119	150	0	123	0	35.7	89.2
MARYLAND	5,318	1,771	905	3,980	1,315	329	3	68	0	43.2	74.9
MASSACHUSETTS	7,052	1,249	51	2,891	218	647	4	578	1	71.4	81.0
MICHIGAN	10,961	6,623	282	10,754	574	1,386	11	325	0	72.3	98.1
MINNESOTA	4,577	3,337	46	4,457	77	341	0	199	0	85.2	97.4
MISSISSIPPI	2,359	1,161	3	2,143	14	187	0	4	0	49.5	98.9
MISSOURI	5,488	3,336	852	5,339	1,421	181	0	0	0	70.8	97.2
MONTANA	757	460	35	748	43	34	0	9	0	61.6	98.9
NEBRASKA	1,562	1,085	14	1,495	11	21	0	0	0	78.2	98.8
NEVADA	933	566	80	923	175	17	0	0	0	95.6	100.0
NEW HAMPSHIRE	1,019	273	43	883	109	126	3	141	5	33.4	65.1
NEW JERSEY	8,822	6,019	417	8,822	1,170	779	74	149	8	82.3	100.0
NEW MEXICO	1,308	690	54	1,257	98	36	0	0	0	68.2	98.7
NEW YORK	21,799	12,841	3,326	18,757	5,026	1,879	19	815	4	78.9	86.0
NORTH CAROLINA	5,880	2,396	287	4,904	414	319	0	185	8	44.8	76.6
NORTH DAKOTA	606	407	0	587	0	0	0	0	0	84.2	83.7
OHIO	13,202	8,369	191	12,732	746	880	47	187	28	77.8	98.4
OKLAHOMA	2,942	1,993	0	2,886	0	136	0	0	0	73.5	98.0
OREGON	2,943	1,814	0	2,943	0	295	0	0	0	79.3	100.0
PENNSYLVANIA	13,342	9,005	638	12,881	1,771	937	9	327	0	76.1	96.4
RHODE ISLAND	1,134	373	40	788	69	153	0	85	0	40.3	67.7
SOUTH CAROLINA	3,023	1,275	297	2,836	883	309	0	4	0	45.3	83.9
SOUTH DAKOTA	643	373	8	512	4	3	0	0	0	54.6	79.7
TENNESSEE	4,880	2,899	242	3,978	338	489	0	46	0	58.1	74.4
TEXAS	15,351	9,635	63	15,351	113	720	0	0	0	78.7	100.0
UTAH	1,509	1,035	11	1,484	16	16	0	0	0	85.8	98.4
VERMONT	536	213	42	338	76	68	2	86	1	65.4	63.1
VIRGINIA	5,958	2,648	435	5,354	958	399	2	169	0	53.3	89.9
WASHINGTON	4,194	1,936	362	3,469	744	378	0	114	0	84.6	82.3
WEST VIRGINIA	1,845	720	22	1,781	28	201	0	1	0	48.0	98.5
WISCONSIN	5,218	3,000	137	4,892	395	191	2	48	0	85.1	86.3
WYOMING	600	283	0	541	0	9	0	0	0	75.9	98.3
AMERICAN SAMOA	40	1	0	36	1	27	0	2	0	4.7	90.5
GUAM	275	67	2	237	45	33	0	21	0	58.5	88.5
PUERTO RICO	3,786	1,003	0	2,736	26	1,132	0	1,025	0	32.9	72.3
PAC. TR. TERR.	205	4	1	152	4	14	0	4	0	3.4	74.2
VIRGIN ISLANDS	116	44	3	102	3	20	0	9	0	50.6	88.4
U.S. TOTALS	259,187	144,368	14,205	232,298	28,181	18,535	271	5,841	62	86.7	89.7

1976 NEEDS SURVEY

FEBRUARY 18, 1977
TABLE 3A

POPULATIONS SERVED BY LESS THAN SECONDARY TREATMENT
PRESENT, RESIDENT & NONRESIDENT
(IN THOUSANDS)

STATE	1975 POPULATION	****** RECEIVING TREATMENT ***** 1975 RES.	1975 NONRES.	*** NOT RECEIVING TREATMENT **** 1975 RES.	1975 NONRES.	** PERCENT SERVED ** 1975	NO. OF TREATMENT PLANTS
ALABAMA	3,614	141	3	27	0	3.9	25
ALASKA	352	130	0	1	0	37.2	13
ARIZONA	2,224	127	198	26	0	5.7	23
ARKANSAS	2,116	642	0	77	0	38.3	67
CALIFORNIA	21,185	8,536	753	419	0	40.3	158
COLORADO	2,834	128	6	2	0	4.8	26
CONNECTICUT	3,095	389	1	15	0	12.6	11
DELAWARE	579	15	16	0	0	2.7	6
DIST. OF COLUM.	716	0	0	0	0	0.0	0
FLORIDA	8,357	369	53	50	0	4.4	15
GEORGIA	4,926	727	76	45	0	14.8	96
HAWAII	865	57	2	55	0	6.7	7
IDAHO	820	170	0	36	0	21.7	20
ILLINOIS	11,145	659	8	38	0	5.8	42
INDIANA	5,311	417	0	46	0	7.9	22
IOWA	2,870	1,963	51	41	0	37.1	140
KANSAS	2,267	1,156	1	99	0	51.0	115
KENTUCKY	3,396	280	1	89	0	8.3	17
LOUISIANA	3,791	1,108	5	29	0	29.2	59
MAINE	1,059	77	26	49	0	7.4	15
MARYLAND	4,098	79	98	28	2	1.9	25
MASSACHUSETTS	5,828	356	36	135	0	6.1	21
MICHIGAN	9,107	957	92	294	11	10.5	35
MINNESOTA	3,926	205	7	18	0	5.2	27
MISSISSIPPI	2,346	511	1	53	0	21.8	44
MISSOURI	4,763	2,407	762	81	0	50.5	183
MONTANA	748	242	18	19	0	32.4	34
NEBRASKA	1,566	319	0	6	0	20.7	42
NEVADA	592	39	0	2	0	6.7	15
NEW HAMPSHIRE	818	143	25	42	0	17.6	14
NEW JERSEY	7,316	1,548	182	183	22	21.2	51
NEW MEXICO	1,147	72	0	8	0	6.3	6
NEW YORK	18,128	4,643	1,554	288	0	25.6	169
NORTH CAROLINA	5,491	265	5	52	0	4.9	29
NORTH DAKOTA	635	77	0	0	0	12.2	22
OHIO	10,759	2,339	111	176	0	21.7	62
OKLAHOMA	2,712	709	0	73	0	26.1	127
OREGON	2,288	2	0	0	0	0.1	1
PENNSYLVANIA	11,827	3,461	448	159	0	29.3	78
RHODE ISLAND	927	73	5	25	0	8.0	6
SOUTH CAROLINA	2,818	259	44	73	0	9.2	97
SOUTH DAKOTA	682	131	0	1	0	19.2	48
TENNESSEE	4,188	393	15	140	0	9.4	29
TEXAS	12,237	237	0	11	0	1.9	31
UTAH	1,296	18	2	0	0	1.5	5
VERMONT	471	104	16	36	1	22.2	23
VIRGINIA	4,967	1,079	188	233	1	21.7	190
WASHINGTON	3,944	1,285	349	238	0	36.3	80
WEST VIRGINIA	1,893	344	0	138	0	19.1	57
WISCONSIN	4,807	586	17	6	0	11.9	94
WYOMING	374	295	0	0	0	55.0	22
AMERICAN SAMOA	30	1	0	27	0	4.7	2
GUAM	121	61	2	22	0	51.1	2
PUERTO RICO	3,049	948	0	923	0	31.1	19
PAC. TR. TERR.	119	2	1	6	0	2.1	4
VIRGIN ISLANDS	87	44	3	28	0	50.6	2
U.S. TOTAL	216,530	40,271	4,968	4,617	39	18.6	2,451

1976 NEEDS SURVEY

FEBRUARY 10, 1977
TABLE 3B

POPULATIONS SERVED BY SECONDARY TREATMENT
PRESENT, RESIDENT & NONRESIDENT
(IN THOUSANDS)

STATE	1975 POPULATION	****** RECEIVING TREATMENT ***** 1975 RES.	1975 NONRES.	*** NOT RECEIVING TREATMENT **** 1975 RES.	1975 NONRES.	** PERCENT SERVED ** 1975	NO. OF TREATMENT PLANTS
ALABAMA	3,614	739	76	166	0	20.5	78
ALASKA	352	28	0	11	0	8.0	4
ARIZONA	2,224	119	14	27	0	5.4	43
ARKANSAS	2,116	300	0	17	0	14.2	18
CALIFORNIA	21,185	1,101	87	124	1	5.2	172
COLORADO	2,534	1,360	105	6	0	53.7	70
CONNECTICUT	3,095	1,400	1	497	0	45.3	62
DELAWARE	579	8	11	2	0	1.4	9
DIST. OF COLUM.	716	0	0	0	0	0.0	0
FLORIDA	8,357	667	50	229	0	8.0	19
GEORGIA	4,926	1,279	61	76	0	26.0	89
HAWAII	965	23	2	36	10	2.7	10
IDAHO	820	108	3	13	0	13.2	11
ILLINOIS	11,145	2,029	156	25	0	18.2	72
INDIANA	5,311	893	7	105	0	16.8	70
IOWA	2,870	399	9	8	0	13.9	72
KANSAS	2,267	534	0	25	2	23.6	20
KENTUCKY	3,396	463	20	170	0	13.6	43
LOUISIANA	3,791	918	7	25	0	24.2	67
MAINE	1,059	187	26	61	0	17.7	37
MARYLAND	4,098	952	619	86	0	23.2	45
MASSACHUSETTS	5,828	431	6	232	4	7.4	37
MICHIGAN	9,157	556	22	100	0	6.1	71
MINNESOTA	3,926	503	18	22	0	12.8	103
MISSISSIPPI	2,366	446	2	124	0	19.0	19
MISSOURI	4,763	645	86	35	0	13.6	73
MONTANA	748	65	6	6	0	8.7	7
NEBRASKA	1,546	393	4	3	0	25.5	34
NEVADA	592	28	2	4	0	4.8	20
NEW HAMPSHIRE	818	83	8	47	0	10.2	26
NEW JERSEY	7,316	881	86	113	52	12.1	58
NEW MEXICO	1,147	555	54	26	0	48.5	22
NEW YORK	18,120	3,324	617	326	2	18.3	165
NORTH CAROLINA	5,651	724	114	138	0	13.3	39
NORTH DAKOTA	635	114	0	0	0	18.1	42
OHIO	10,759	1,298	10	104	36	12.0	134
OKLAHOMA	2,712	725	0	34	0	26.7	10
OREGON	2,288	721	0	63	0	31.5	20
PENNSYLVANIA	11,827	3,146	80	309	8	26.6	244
RHODE ISLAND	927	45	0	92	0	4.9	4
SOUTH CAROLINA	2,818	534	179	94	0	18.9	82
SOUTH DAKOTA	683	88	6	0	0	12.9	21
TENNESSEE	4,188	354	34	56	0	8.5	80
TEXAS	12,237	709	1	96	0	5.8	188
UTAH	1,206	500	8	7	0	41.5	28
VERMONT	471	94	23	17	0	20.2	33
VIRGINIA	4,907	248	32	42	0	5.8	121
WASHINGTON	3,544	161	8	39	0	4.5	23
WEST VIRGINIA	1,803	197	0	49	0	11.0	65
WISCONSIN	4,687	1,370	75	109	1	29.7	129
WYOMING	374	36	0	0	0	9.9	4
AMERICAN SAMOA	30	0	0	0	0	0.0	0
GUAM	121	1	0	7	0	0.8	1
PUERTO RICO	3,049	23	0	96	0	0.8	3
PAC. TR. TERR.	119	0	0	0	0	0.0	1
VIRGIN ISLANDS	87	0	0	0	0	0.0	0
U.S. TOTAL	216,548	32,523	2,754	4,107	119	15.0	2,630

1976 NEEDS SURVEY

FEBRUARY 10, 1977
TABLE 3C

POPULATIONS SERVED BY TERTIARY TREATMENT
PRESENT, RESIDENT & NONRESIDENT
(IN THOUSANDS)

STATE	1975 POPULATION	****** RECEIVING TREATMENT ***** 1975 RES.	1975 NONRES.	*** NOT RECEIVING TREATMENT **** 1975 RES.	1975 NONRES.	** PERCENT SERVED ** 1975	NO. OF TREATMENT PLANTS
ALABAMA	3,614	872	19	152	0	24.1	26
ALASKA	352	1	0	0	0	0.5	2
ARIZONA	2,224	428	1	32	0	19.2	7
ARKANSAS	2,116	23	2	1	0	1.1	6
CALIFORNIA	21,185	5,593	214	560	0	26.4	153
COLORADO	2,524	502	33	2	0	19.8	36
CONNECTICUT	3,095	73	15	85	0	2.4	21
DELAWARE	579	88	329	45	40	15.2	9
DIST. OF COLUM.	716	758	1,142	0	0	105.9	1
FLORIDA	8,397	2,814	453	809	0	33.7	142
GEORGIA	4,926	565	38	184	0	11.5	43
HAWAII	865	38	12	11	0	3.6	11
IDAHO	820	24	0	0	0	3.0	2
ILLINOIS	11,145	2,357	97	114	0	21.2	225
INDIANA	5,311	1,215	206	123	0	22.9	67
IOWA	2,878	345	16	13	0	12.0	21
KANSAS	2,267	11	0	4	0	0.5	10
KENTUCKY	3,396	164	12	50	0	4.8	16
LOUISIANA	3,791	368	13	80	37	9.7	10
MAINE	1,059	60	17	21	0	5.7	17
MARYLAND	4,098	700	193	204	0	17.1	59
MASSACHUSETTS	5,828	266	5	217	0	4.6	28
MICHIGAN	9,157	1,419	178	440	0	15.5	41
MINNESOTA	3,926	498	12	49	0	11.7	36
MISSISSIPPI	2,346	153	0	3	0	6.5	8
MISSOURI	4,763	144	3	54	0	3.0	7
MONTANA	748	14	1	3	0	1.9	7
NEBRASKA	1,546	334	10	10	0	21.7	33
NEVADA	592	492	76	10	0	83.2	8
NEW HAMPSHIRE	818	2	3	13	3	0.3	5
NEW JERSEY	7,516	3,268	60	434	0	44.7	85
NEW MEXICO	1,147	0	0	0	0	0.0	0
NEW YORK	18,120	3,924	1,077	1,185	0	21.7	145
NORTH CAROLINA	5,451	1,083	62	104	0	19.9	62
NORTH DAKOTA	635	129	0	0	0	20.4	6
OHIO	10,759	3,534	67	449	11	32.8	214
OKLAHOMA	2,712	335	0	16	0	12.4	20
OREGON	2,288	487	0	177	0	21.3	38
PENNSYLVANIA	11,827	1,645	105	354	1	13.9	157
RHODE ISLAND	927	62	0	22	0	6.7	2
SOUTH CAROLINA	2,818	373	56	78	0	73.3	45
SOUTH DAKOTA	683	125	1	1	0	18.3	19
TENNESSEE	4,188	469	53	186	0	11.2	102
TEXAS	12,237	7,592	69	470	0	62.0	403
UTAH	1,208	279	0	6	0	23.2	28
VERMONT	471	11	0	3	0	2.5	7
VIRGINIA	4,987	954	59	63	0	19.2	157
WASHINGTON	3,544	296	3	83	0	8.4	4
WEST VIRGINIA	1,803	169	15	17	0	8.9	8
WISCONSIN	4,807	676	21	36	0	14.7	155
WYOMING	374	19	0	0	0	5.2	4
AMERICAN SAMOA	30	0	0	0	0	0.0	0
GUAM	121	4	0	3	0	3.6	1
PUERTO RICO	3,049	6	0	29	0	0.2	1
PAC. TR. TERR.	119	1	0	8	0	1.3	2
VIRGIN ISLANDS	87	0	0	0	0	0.0	0
U.S. TOTAL	216,930	45,733	4,765	6,960	102	21.1	2,719

1976 NEEDS SURVEY

FEBRUARY 18, 1977
TABLE 3D

POPULATIONS TO BE SERVED BY SECONDARY TREATMENT
PROJECTED, RESIDENT & NONRESIDENT
(IN THOUSANDS)

STATE	1990 POPULATION	****** RECEIVING TREATMENT ***** 1990 RES.	1990 NONRES.	*** NOT RECEIVING TREATMENT **** 1990 RES.	1990 NONRES.	** PERCENT SERVED ** 1990	NO. OF TREATMENT PLANTS
ALABAMA	3,850	1,743	196	34	0	45.3	131
ALASKA	408	170	2	0	0	41.8	115
ARIZONA	3,384	1,235	205	10	0	36.5	134
ARKANSAS	2,225	857	0	0	0	38.6	47
CALIFORNIA	26,601	7,950	1,043	4	0	29.9	445
COLORADO	3,408	1,191	156	1	0	35.0	116
CONNECTICUT	3,946	2,729	35	339	0	69.2	68
DELAWARE	793	8	0	0	0	0.1	2
DIST. OF COLUM.	764	0	0	0	0	0.0	0
FLORIDA	11,728	2,472	354	12	0	21.1	18
GEORGIA	5,667	1,686	130	1	0	29.8	114
HAWAII	1,132	550	110	13	0	48.7	33
IDAHO	900	564	53	0	0	62.7	84
ILLINOIS	13,177	575	39	6	0	4.4	42
INDIANA	6,433	525	52	9	0	8.2	42
IOWA	3,053	1,024	54	0	0	33.5	232
KANSAS	2,509	1,536	15	0	0	61.3	107
KENTUCKY	3,741	1,150	26	17	0	30.7	56
LOUISIANA	4,159	2,664	61	0	0	64.1	143
MAINE	1,142	391	97	64	0	34.3	88
MARYLAND	5,318	42	0	0	0	0.8	25
MASSACHUSETTS	7,052	1,674	170	285	1	23.7	65
MICHIGAN	10,961	6,208	187	133	0	56.6	107
MINNESOTA	4,577	797	16	11	0	17.4	125
MISSISSIPPI	2,359	750	5	2	0	31.8	36
MISSOURI	5,488	4,766	1,368	0	0	86.8	227
MONTANA	757	377	28	8	0	49.9	42
NEBRASKA	1,562	295	0	0	0	18.9	56
NEVADA	933	101	7	0	0	10.9	51
NEW HAMPSHIRE	1,019	326	68	64	0	32.1	55
NEW JERSEY	8,822	1,677	541	6	0	19.0	26
NEW MEXICO	1,300	1,080	90	0	0	83.1	29
NEW YORK	21,799	8,247	1,023	248	1	37.8	454
NORTH CAROLINA	5,880	1,077	170	64	0	18.3	47
NORTH DAKOTA	606	277	0	0	0	45.8	83
OHIO	13,202	861	83	1	0	6.5	51
OKLAHOMA	2,942	510	0	8	0	17.4	45
OREGON	2,943	826	0	0	0	28.1	11
PENNSYLVANIA	13,342	4,923	210	118	0	36.9	387
RHODE ISLAND	1,134	472	61	48	0	41.7	13
SOUTH CAROLINA	3,023	1,183	396	0	0	39.1	80
SOUTH DAKOTA	643	166	0	0	0	25.9	78
TENNESSEE	4,800	719	54	9	0	15.0	117
TEXAS	15,351	420	0	0	0	2.7	34
UTAH	1,509	0	0	0	0	0.0	0
VERMONT	536	288	57	37	0	53.9	69
VIRGINIA	5,958	2,046	143	89	0	34.4	296
WASHINGTON	4,194	2,074	621	28	0	49.5	121
WEST VIRGINIA	1,845	1,233	5	0	0	66.9	431
WISCONSIN	5,218	1,480	84	1	0	28.4	241
WYOMING	600	418	0	0	0	69.7	25
AMERICAN SAMOA	40	36	1	2	0	90.5	5
GUAM	275	99	41	11	0	36.0	3
PUERTO RICO	3,786	1,622	0	617	0	42.9	18
PAC. TR. TERR.	205	135	5	8	0	65.9	37
VIRGIN ISLANDS	116	102	3	9	0	88.4	4
U.S. TOTAL	259,187	76,345	8,797	2,290	12	29.5	5,515

1976 NEEDS SURVEY

FEBRUARY 10, 1977
TABLE 3E

POPULATIONS TO BE SERVED BY TERTIARY TREATMENT
PROJECTED, RESIDENT & NONRESIDENT
(IN THOUSANDS)

STATE	1990 POPULATION	****** RECEIVING TREATMENT ****** 1990 RES.	1990 NONRES.	*** NOT RECEIVING TREATMENT **** 1990 RES.	1990 NONRES.	** PERCENT SERVED ** 1990	NO. OF TREATMENT PLANTS
ALABAMA	3,850	1,359	30	174	0	35.3	37
ALASKA	408	32	0	0	0	7.9	2
ARIZONA	3,384	149	12	0	0	4.4	14
ARKANSAS	2,225	1,121	5	0	0	50.4	77
CALIFORNIA	26,601	14,672	878	51	0	55.2	177
COLORADO	3,480	2,111	296	0	0	62.1	34
CONNECTICUT	3,946	478	15	98	0	12.1	26
DELAWARE	793	254	785	12	21	32.0	16
DIST. OF COLUM.	764	763	1,463	0	0	100.0	1
FLORIDA	11,728	7,741	1,112	109	0	66.0	139
GEORGIA	5,667	3,148	205	10	0	95.6	100
HAWAII	1,132	425	153	5	0	37.6	8
IDAHO	900	85	0	8	0	9.5	5
ILLINOIS	13,177	12,714	627	38	0	96.5	447
INDIANA	6,433	4,985	754	34	0	77.5	272
IOWA	3,053	1,565	132	0	0	51.3	59
KANSAS	2,509	265	0	0	0	10.6	22
KENTUCKY	3,741	1,557	81	44	0	41.6	50
LOUISIANA	4,159	1,221	62	0	0	29.4	30
MAINE	1,142	170	4	23	0	15.0	28
MARYLAND	5,318	3,926	1,315	68	0	73.8	252
MASSACHUSETTS	7,052	815	26	271	0	11.6	42
MICHIGAN	10,961	3,855	428	175	0	35.2	85
MINNESOTA	4,577	3,226	34	95	0	70.5	76
MISSISSIPPI	2,389	886	9	0	0	37.4	31
MISSOURI	5,488	412	41	0	0	7.5	11
MONTANA	757	29	1	0	0	3.9	10
NEBRASKA	1,562	1,148	10	0	0	73.8	62
NEVADA	933	313	116	0	0	33.6	10
NEW HAMPSHIRE	1,019	336	41	77	5	33.0	38
NEW JERSEY	8,822	7,678	265	141	0	87.0	102
NEW MEXICO	1,308	125	0	0	0	9.7	2
NEW YORK	21,799	9,148	3,109	544	2	42.0	377
NORTH CAROLINA	5,880	2,992	241	89	0	50.9	96
NORTH DAKOTA	606	210	0	0	0	34.8	8
OHIO	13,202	11,587	662	106	28	87.8	467
OKLAHOMA	2,942	1,670	0	0	0	56.8	139
OREGON	2,943	2,556	0	0	0	86.9	42
PENNSYLVANIA	13,342	6,978	1,515	174	0	52.3	308
RHODE ISLAND	1,134	203	5	42	0	17.9	6
SOUTH CAROLINA	3,023	1,111	379	4	0	36.8	198
SOUTH DAKOTA	643	318	4	0	0	49.6	27
TENNESSEE	4,880	1,932	130	25	0	40.3	177
TEXAS	15,351	14,907	113	0	0	97.1	564
UTAH	1,509	1,484	16	0	0	98.4	105
VERMONT	536	47	19	18	0	8.9	22
VIRGINIA	5,958	2,883	159	79	0	48.4	201
WASHINGTON	4,194	1,007	94	85	0	24.0	15
WEST VIRGINIA	1,845	524	23	0	0	28.4	92
WISCONSIN	5,218	2,525	188	37	0	48.4	286
WYOMING	680	24	0	0	0	4.1	3
AMERICAN SAMOA	40	0	0	0	0	0.0	0
GUAM	275	21	0	1	0	7.9	2
PUERTO RICO	3,786	840	26	347	0	22.2	11
PAC. TR. TERR.	205	17	1	4	0	8.3	2
VIRGIN ISLANDS	116	0	0	0	0	0.0	0
U.S. TOTAL	259,187	140,568	15,605	2,997	90	54.3	5,402

1976 NEEDS SURVEY

COLLECTION POPULATIONS
PRESENT, PROJECTED, RESIDENT & NONRESIDENT
(IN THOUSANDS)

FEBRUARY 10,1977
TABLE 4

STATE	1990 CEILING POPULATION	***,*** RECEIVING COLLECTION *****				*** NOT RECEIVING COLLECTION ***				PERCENT SERVED	
		1975 RES.	1975 NONRES.	1990 RES.	1990 NONRES.	1975 RES.	1975 NONRES.	1990 RES.	1990 NONRES.	1976	1990
ALABAMA	3,850	1,962	123	3,559	268	473	0	254	0	54.3	92.4
ALASKA	408	184	3	428	14	16	0	0	0	52.5	100.0
ARIZONA	3,384	1,624	121	2,593	218	124	0	10	0	73.0	76.6
ARKANSAS	2,225	1,048	2	2,021	5	187	0	0	0	49.6	99.8
CALIFORNIA	26,601	17,866	1,610	24,535	2,192	1,432	6	98	0	84.3	92.2
COLORADO	3,400	2,377	111	3,490	471	16	0	0	0	93.8	100.0
CONNECTICUT	3,946	1,961	35	3,391	46	750	0	584	0	63.4	86.8
DELAWARE	793	424	46	721	337	78	39	55	621	73.4	91.0
DIST. OF COLUM.	764	758	223	763	235	0	0	0	0	105.9	100.0
FLORIDA	11,728	4,560	832	11,728	1,984	1,735	0	379	0	54.6	100.0
GEORGIA	5,667	3,089	221	5,205	429	352	0	49	0	62.7	91.9
HAWAII	1,132	221	26	1,085	274	96	0	19	0	25.6	95.9
IDAHO	980	442	7	980	72	100	0	0	0	54.0	100.0
ILLINOIS	13,177	11,145	911	13,177	1,221	412	0	157	0	100.0	100.0
INDIANA	6,433	3,340	553	6,431	816	590	0	43	0	62.9	93.8
IOWA	3,053	2,217	97	3,010	141	87	0	2	0	77.3	98.6
KANSAS	2,589	1,766	1	2,589	4	133	2	0	0	77.9	100.0
KENTUCKY	3,761	1,624	54	2,998	135	581	0	62	0	47.8	80.2
LOUISIANA	4,159	2,592	83	4,076	111	76	0	0	0	68.4	98.0
MAINE	1,142	541	79	926	148	226	0	185	11	51.2	81.2
MARYLAND	5,318	2,847	1,004	5,318	1,360	291	3	78	0	69.5	100.0
MASSACHUSETTS	7,852	3,913	101	5,942	308	982	4	842	1	67.2	84.3
MICHIGAN	10,961	8,112	350	10,961	787	2,210	11	569	0	88.6	100.0
MINNESOTA	4,577	3,926	63	4,577	196	489	0	122	0	100.0	100.0
MISSISSIPPI	2,389	1,160	3	2,153	14	189	0	4	0	49.5	91.3
MISSOURI	5,488	3,398	856	5,439	1,188	184	0	0	0	71.4	99.1
MONTANA	787	460	35	757	43	37	0	0	0	61.5	100.0
NEBRASKA	1,562	1,112	15	1,562	11	22	0	0	0	72.0	100.0
NEVADA	933	566	81	933	175	36	0	0	0	95.7	100.0
NEW HAMPSHIRE	1,019	436	70	805	105	193	5	194	5	53.4	79.1
NEW JERSEY	8,822	6,354	636	8,770	1,475	720	74	242	8	86.9	99.4
NEW MEXICO	1,308	690	54	1,260	92	44	0	0	0	60.2	96.9
NEW YORK	21,799	13,009	4,888	18,825	5,789	3,046	14	1,742	5	71.8	86.4
NORTH CAROLINA	5,880	2,447	267	4,727	476	302	0	203	0	44.9	80.4
NORTH DAKOTA	606	406	0	587	0	0	0	0	0	64.1	83.7
OHIO	13,202	9,723	210	13,202	789	1,167	59	103	20	90.4	100.0
OKLAHOMA	2,942	1,995	0	2,899	0	137	0	0	0	73.6	98.6
OREGON	2,943	1,866	0	2,943	0	648	0	0	0	81.6	100.0
PENNSYLVANIA	13,342	9,148	265	13,342	723	707	4	559	3	77.3	100.0
RHODE ISLAND	1,134	551	5	994	19	229	0	115	0	59.5	87.7
SOUTH CAROLINA	3,023	1,344	306	2,677	612	347	0	12	0	47.7	88.6
SOUTH DAKOTA	643	372	6	512	4	2	0	0	0	54.6	79.7
TENNESSEE	4,880	2,893	245	3,599	347	417	0	47	0	50.8	75.8
TEXAS	15,351	9,658	17	15,351	48	735	0	4	0	78.9	100.0
UTAH	1,509	1,036	5	1,485	28	15	0	0	0	85.9	98.5
VERMONT	536	223	45	385	82	57	7	64	7	47.4	68.3
VIRGINIA	5,958	2,380	194	5,958	581	263	1	246	0	47.5	100.0
WASHINGTON	4,194	2,179	437	4,194	831	427	2	6	0	61.5	100.0
WEST VIRGINIA	1,845	731	22	1,794	25	82	0	2	0	40.6	97.3
WISCONSIN	5,218	4,162	115	5,218	305	417	16	97	0	99.4	100.0
WYOMING	600	283	0	542	0	0	0	0	0	79.9	90.4
AMERICAN SAMOA	48	1	0	36	1	27	0	2	0	4.7	90.5
GUAM	275	67	8	262	45	33	0	21	0	55.5	91.7
PUERTO RICO	3,746	1,025	0	2,736	26	1,110	8	1,025	0	33.8	72.3
PAC. TR. TERR.	205	4	1	192	6	14	0	4	0	3.4	74.2
VIRGIN ISLANDS	116	44	3	102	3	20	0	9	0	50.6	88.4
U.S. TOTALS	259,107	157,434	15,173	243,929	25,783	22,929	255	8,229	883	72.7	94.1

1976 NEEDS SURVEY

FEBRUARY 10, 1977
TABLE 5

NUMBERS OF FACILITIES NEEDING COLLECTOR SEWERS
BY SERVICE-AREA POPULATION AND PER-CAPITA SEWER COST

COLLECTOR SEWER COST $/CAPITA	SERVICE-AREA POPULATION 0-999	1,000-4,999	5,000-9,999	10,000-49,999	50K-100K	>100K	TOTAL
0-10	0	2	3	4	3	2	14
10-25	1	2	1	5	2	1	12
25-50	1	15	7	17	5	3	48
50-100	5	25	23	47	7	4	111
100-150	9	43	20	36	6	2	116
150-200	8	28	23	36	9	3	107
200-250	20	50	21	44	6	12	193
250-300	12	39	15	49	7	5	127
300-400	45	123	48	109	21	9	355
400-500	191	554	178	317	58	37	1,335
500-600	38	144	72	153	25	22	444
600-700	39	174	103	104	11	7	438
700-800	48	171	62	81	16	6	384
800-900	31	185	34	41	5	5	221
900-1000	23	43	26	44	3	2	141
>1000	149	373	180	269	31	16	994
TOTAL	612	1,881	796	1,352	215	136	

1976 NEEDS SURVEY

FEBRUARY 10,1977
TABLE 6

PERCENT OF COLLECTOR DOLLAR NEEDS BY SERVICE-AREA POPULATION AND COST/CAPITA

COLLECTION SEWER COST $/CAPITA	SERVICE-AREA POPULATION 0-999	1,000-4,999	5,000-9,999	10,000-49,999	50K-100K	>100K
0-10	0.0	0.0	0.0	0.0	0.0	0.0
10-25	0.0	0.0	0.0	0.0	0.2	0.1
25-50	0.0	0.3	0.1	0.2	0.0	0.2
50-100	0.1	0.3	0.7	0.5	1.1	0.5
100-150	0.3	0.7	1.1	0.8	0.9	0.2
150-200	0.5	0.4	1.5	0.9	1.1	0.3
200-250	1.1	0.9	1.0	1.1	1.2	4.9
250-300	0.7	1.3	1.4	1.0	2.5	2.5
300-400	2.5	4.3	4.8	0.0	0.1	3.6
400-500	11.7	15.6	14.5	13.5	38.3	17.4
500-600	4.0	7.9	9.4	9.2	17.3	6.7
600-700	6.8	9.0	11.5	6.1	7.3	2.5
700-800	9.7	7.9	7.7	6.9	14.6	14.1
800-900	4.2	4.8	4.7	5.2	3.5	22.8
900-1000	4.1	3.7	4.9	3.9	0.5	3.2
>1000	50.3	42.8	38.7	43.9	22.6	21.0
TOTALS	100.0	100.0	100.0	100.0	100.0	100.0

FEBRUARY 10, 1977
TABLE 7

1976 NEEDS SURVEY

AVERAGE PIPE COSTS BASED ON FIRM ENGINEERING ESTIMATES OR PREVIOUS COMPARABLE CONSTRUCTION

MEAN COST PER METER BY DIAMETER OF PIPE IN CENTIMETERS

	15-31 (6"-12")	31.1-54 (13"-21")	54.1-77 (22"-30")	77.1-107 (31"-42")	107.1-122 (43"-48")	122.1-200 (49"-78")	200+ (79"+)
ALABAMA	74.13						
ALASKA	233.72	487.46	492.12	492.12	492.12	1,251.81	
ARIZONA							
ARKANSAS	63.23	55.83	64.35				
CALIFORNIA	72.46	91.71		181.43			
COLORADO	61.89		173.50			777.92	
CONNECTICUT	139.95	250.51	303.58		315.07		2,709.97
DELAWARE	84.27			473.25			4,513.99
DIST. OF COLUM.							
FLORIDA	278.98	567.65	568.98				
GEORGIA	67.46	94.27	131.76	225.31	319.41	366.63	
HAWAII	294.48						
IDAHO	65.13						
ILLINOIS	73.75	93.73	495.50	322.43		357.48	
INDIANA	94.20		458.68	181.51			
IOWA	71.19	173.20	248.48	381.68	416.09		730.41
KANSAS	66.00	82.75	173.26				
KENTUCKY	82.13	110.72	247.51				
LOUISIANA							
MAINE	114.59	162.19	229.65			328.08	410.10
MARYLAND	113.88	202.92	392.43				
MASSACHUSETTS	122.19	148.42	239.93	484.09	875.21	572.93	
MICHIGAN	136.17	208.39	184.88	376.71		457.83	
MINNESOTA	85.41	193.20		234.59	413.26		
MISSISSIPPI							
MISSOURI	72.29	283.40	246.70	455.81	627.79	791.26	4,698.44
MONTANA							
NEBRASKA	111.94	115.04		176.88	495.83	612.42	
NEVADA	81.55						
NEW HAMPSHIRE	126.83	220.06	274.31				
NEW JERSEY	141.18	442.26	198.34	228.56			
NEW MEXICO							
NEW YORK	383.47	1,237.31	666.39	486.78	3,165.02	10,957.21	27,211.97
NORTH CAROLINA			258.43				
NORTH DAKOTA							
OHIO	114.29	202.56	287.24	442.14	467.87	722.61	1,960.97
OKLAHOMA	60.48	93.84					
OREGON	126.25	138.23	150.27	164.22		532.15	
PENNSYLVANIA	100.92	141.36	187.19	306.47			
RHODE ISLAND	136.07	255.94	218.71				
SOUTH CAROLINA							
SOUTH DAKOTA							
TENNESSEE	61.18		289.53	326.47		447.37	
TEXAS	58.65	91.88	132.17	169.44	188.95	301.53	419.18
UTAH	36.98	73.65	143.35	261.98			
VERMONT	118.68						
VIRGINIA	72.22	79.33	191.33	740.17	725.78	442.40	
WASHINGTON	174.66		167.58	320.17	404.05	501.12	
WEST VIRGINIA	56.36						
WISCONSIN	97.09	148.01	271.46	381.12			
WYOMING							
AMERICAN SAMOA							
GUAM							
PUERTO RICO	37.25						
PAC. TR. TERR.	98.11						
VIRGIN ISLANDS							
UNITED STATES MEAN	118.19	224.90	233.35	330.33	363.91	438.14	2,716.27

FEBRUARY 10, 1977
TABLE 8

1976 NEEDS SURVEY

TOTAL PIPE LENGTH NEEDED BY DIAMETER
(LENGTH IN METERS-DIAMETER IN CENTIMETERS)

	15-31 (6"-12")	31.1-54 (13"-21")	54.1-77 (22"-30")	77.1-107 (31"-42")	107.1-122 (43"-48")	122.1-200 (49"-78")	200+ (79"+)
ALABAMA	3,280,033	274,913	120,714	64,789	152	10,056	
ALASKA	374,822	67,593	9,143	29,584	6,095	2,397	
ARIZONA	1,889,488	71,387	77,862	95,137	8,072	69,228	
ARKANSAS	1,830,278	137,538	56,680	36,416			
CALIFORNIA	8,444,410	787,966	604,976	511,269	6,095	233,054	81,944
COLORADO	243,578	156,838	85,891	66,184	4,876		
CONNECTICUT	3,375,997	319,685	117,023	17,059	10,145	4,169	152
DELAWARE	360,381	60,641	49,730	11,428		3,657	
DIST. OF COLUM.				1,502			1,452
FLORIDA	7,161,373	1,011,586	425,982	328,224	46,899	128,229	
GEORGIA	3,311,118	600,142	291,469	97,764	28,482	75,369	13,719
HAWAII	1,201,737	272,468	133,137	23,635	18,394	45,196	
IDAHO	1,249,315	350,364	114,235	212,846	76,199		
ILLINOIS	2,101,428	502,542	186,551	194,687	42,286	59,827	9,418
INDIANA	2,703,180	329,700	128,583	226,589	127,427	6,964	5,181
IOWA	878,256	135,836	103,153	62,215	13,998	689	10,424
KANSAS	881,661	150,534	27,750	114,669	89,877	64,951	
KENTUCKY	2,276,199	279,388	118,305	37,917	103,814	14,173	18,489
LOUISIANA	1,627,631	201,886	233,317	72,770			
MAINE	1,566,600	248,985	34,503			3,047	6,895
MARYLAND	1,365,697	537,551	405,534	75,563	15,377	45,915	17,321
MASSACHUSETTS	5,578,623	521,088	511,167	143,265	26,138	56,397	6,988
MICHIGAN	4,063,589	1,084,430	291,707	346,470	10,436	264,859	
MINNESOTA	1,547,963	205,688	43,433	114,768	50,977	39,806	31,394
MISSISSIPPI	601,800	195,528	109,697	116,505		67,679	
MISSOURI	1,390,471	205,119	110,256	88,278	86,967	65,440	56,845
MONTANA	229,128	31,546	57,241	66,659			
NEBRASKA	236,493	45,264	22,226	151,208	1,889	22,299	1,797
NEVADA	550,115	39,580	10,438	14,428	9,180	27,866	
NEW HAMPSHIRE	2,216,635	221,479	124,858	21,232		15,575	
NEW JERSEY	3,665,208	182,588	208,879	83,168	102,031	88,729	36,164
NEW MEXICO	286,607	46,814	37,261	19,478			
NEW YORK	9,845,884	894,865	643,232	184,813	381,474	86,478	110,762
NORTH CAROLINA	1,857,113	515,297	281,246	116,890	109,225	81,137	
NORTH DAKOTA	38,633	8,668	6,339	8,107	8,229		
OHIO	4,733,408	1,625,446	688,324	544,263	183,916	275,889	91,452
OKLAHOMA	1,192,848	98,285	58,814	58,306	32,781	81,442	
OREGON	1,110,485	248,878	314,174	348,978		91,719	1,969
PENNSYLVANIA	10,547,432	486,518	240,030	66,439	914	4,114	
RHODE ISLAND	1,039,814	230,618	82,494				
SOUTH CAROLINA	3,862,707	733,786	318,519	147,367	26,761	15,888	
SOUTH DAKOTA	98,529	33,015	11,225	35,653			
TENNESSEE	3,824,311	518,936	175,570	148,008	31,112	24,018	
TEXAS	7,607,273	994,206	662,856	328,782	120,170	598,306	11,726
UTAH	963,928	302,404	76,138	1,664		10,858	
VERMONT	716,698	13,992	8,148	1,523			
VIRGINIA	4,286,170	595,826	322,879	164,690	17,015	7,450	
WASHINGTON	2,946,466	207,890	278,273	396,121	128,844	99,910	
WEST VIRGINIA	10,066,744	947,554	67,481			68	
WISCONSIN	3,091,778	390,847	281,459	166,895	72,375	127,986	9,695
WYOMING	60,896	15,866	5,486				
AMERICAN SAMOA	75,218		75,895				
GUAM	230,077	11,149	7,924				
PUERTO RICO	1,591,925	289,888	283,486	135,404			
PAC. TR. TERR.	388,516	2,362					
VIRGIN ISLANDS	177,858	7,635	3,387				
UNITED STATES TOTALS	136,023,652	18,234,812	9,748,234	6,261,369	1,915,832	2,903,115	522,741

FEBRUARY 10, 1977
TABLE 9

1976 NEEDS SURVEY

LENGTH AND COST OF PIPE BASED ON 1998 POPULATION TO RECEIVE COLLECTION

STATE	TOTAL LENGTH IN METERS			PER CAPITA LENGTH			MEAN COST PER METER (DOLLARS)		
	COLLECTOR	INTERCEPTOR	ALL PIPE	COLLECTOR	INTERCEPTOR	ALL PIPE	COLLECTOR	INTERCEPTOR	ALL PIPE
ALABAMA	3,378,852	1,295,815	4,666,668	1.27	0.49	1.75	58.78	82.18	89.48
ALASKA	381,945	217,321	598,367	0.77	0.44	1.21	188.63	545.68	313.21
ARIZONA	1,099,238	636,163	2,535,401	0.76	0.25	1.01	84.74	163.00	81.98
ARKANSAS	1,073,665	334,101	1,407,767	0.75	0.23	0.99	59.86	98.51	86.98
CALIFORNIA	12,478,483	3,127,088	15,597,692	0.56	0.14	0.70	66.96	197.78	93.19
COLORADO	219,104	350,298	560,403	0.09	0.14	0.23	38.48	105.29	80.21
CONNECTICUT	3,317,184	598,438	3,915,622	1.03	0.19	1.21	141.03	273.51	161.28
DELAWARE	453,274	466,570	919,844	0.81	0.83	1.65	71.77	126.91	99.74
DIST. OF COLUM.	0	2,954	2,954	0.00	0.00	0.00	0.00	2659.45	2659.45
FLORIDA	13,031,650	3,674,148	16,705,799	1.31	0.37	1.68	72.23	179.41	95.80
GEORGIA	2,581,514	2,478,996	5,060,511	0.71	0.68	1.39	56.62	101.99	78.88
HAWAII	1,917,503	640,856	2,558,359	1.96	0.66	2.62	67.05	391.92	148.43
IDAHO	1,319,882	1,000,635	2,320,517	1.42	1.07	2.49	71.09	133.47	97.99
ILLINOIS	2,394,354	1,182,134	3,576,488	0.21	0.11	0.32	96.21	334.47	174.96
INDIANA	2,960,710	1,368,718	4,329,428	0.59	0.27	0.86	114.11	217.00	144.64
IOWA	742,536	527,318	1,269,854	0.41	0.29	0.71	59.88	169.82	105.54
KANSAS	1,027,798	728,899	1,756,697	0.58	0.36	0.86	88.22	186.14	128.85
KENTUCKY	2,223,343	1,938,637	4,161,981	1.00	0.88	1.88	68.15	111.09	88.15
LOUISIANA	2,109,979	750,762	2,860,742	0.77	0.27	1.04	39.41	100.88	55.52
MAINE	1,386,560	562,603	1,949,163	1.56	0.63	2.19	129.65	146.74	134.58
MARYLAND	1,121,026	1,667,609	2,788,636	0.21	0.31	0.52	61.09	196.82	142.26
MASSACHUSETTS	5,886,138	1,752,693	7,638,832	1.16	0.35	1.51	148.85	233.85	162.00
MICHIGAN	6,136,141	2,216,418	8,352,560	0.58	0.21	0.78	179.64	393.34	236.35
MINNESOTA	1,429,020	753,652	2,182,673	0.29	0.15	0.45	91.29	335.32	175.55
MISSISSIPPI	575,168	712,191	1,287,360	0.40	0.50	0.90	59.34	106.91	85.66
MISSOURI	1,299,320	1,083,059	2,383,188	0.35	0.29	0.64	59.61	254.24	148.13
MONTANA	175,047	216,478	391,525	0.32	0.39	0.71	63.13	155.86	114.48
NEBRASKA	288,596	287,539	488,135	0.15	0.21	0.35	68.16	178.93	130.12
NEVADA	488,539	162,805	651,344	0.75	0.25	1.00	54.58	212.79	94.86
NEW HAMPSHIRE	1,742,720	1,103,179	2,845,899	2.18	1.38	3.55	122.15	163.41	138.15
NEW JERSEY	3,984,445	914,110	4,818,555	0.84	0.20	1.04	101.83	332.16	145.53
NEW MEXICO	362,494	133,085	495,579	0.37	0.14	0.51	43.67	80.88	53.45
NEW YORK	12,672,181	3,018,127	15,890,309	0.95	0.22	1.17	248.77	608.32	317.06
NORTH CAROLINA	1,639,048	2,201,976	3,841,024	0.96	0.72	1.26	52.26	107.11	83.78
NORTH DAKOTA	32,381	51,256	83,638	0.10	0.16	0.26	36.35	162.48	113.64
OHIO	5,868,525	4,006,680	9,875,206	0.52	0.36	0.88	130.52	285.55	193.42
OKLAHOMA	1,145,697	537,492	1,683,188	0.50	0.23	0.73	40.58	173.65	83.02
OREGON	1,943,271	1,240,549	3,183,820	0.77	0.49	1.26	100.37	223.58	148.35
PENNSYLVANIA	9,552,396	2,370,104	11,922,580	1.88	0.45	2.24	76.98	113.86	84.31
RHODE ISLAND	1,615,674	286,030	1,881,705	1.63	0.27	1.90	138.44	214.32	149.17
SOUTH CAROLINA	2,933,622	2,735,118	5,668,741	1.25	1.17	2.42	57.48	89.11	72.78
SOUTH DAKOTA	53,240	141,845	195,086	0.16	0.42	0.58	48.53	121.98	101.88
TENNESSEE	4,876,323	2,149,318	7,025,641	1.50	0.66	2.16	61.49	105.49	74.95
TEXAS	7,226,682	4,394,365	11,620,947	0.51	0.31	0.82	55.97	138.04	83.98
UTAH	957,341	599,550	1,556,891	0.87	0.55	1.42	36.53	34.48	35.74
VERMONT	660,154	155,883	816,037	2.15	0.51	2.66	117.64	123.27	118.72
VIRGINIA	3,362,671	2,774,511	6,137,182	0.73	0.60	1.33	57.95	81.08	68.41
WASHINGTON	4,165,106	952,729	5,117,835	0.93	0.21	1.14	94.24	245.98	122.47
WEST VIRGINIA	6,360,434	5,363,515	11,723,949	4.81	4.06	8.87	98.58	136.16	115.73
WISCONSIN	3,071,750	1,395,725	4,467,475	1.00	0.45	1.45	135.94	322.98	194.35
WYOMING	50,115	32,135	82,250	0.22	0.14	0.35	97.95	81.28	91.44
AMERICAN SAMOA	73,999	77,114	151,113	2.04	2.13	4.17	102.73	286.31	196.41
GUAM	388,313	60,450	368,764	1.19	0.24	1.43	103.24	189.41	117.78
PUERTO RICO	2,892,290	869,972	2,962,262	0.76	0.32	1.08	113.09	268.38	156.33
PAC. TR. TERR.	365,089	25,788	390,878	2.73	0.19	2.93	97.83	136.84	100.41
VIRGIN ISLANDS	276,819	12,062	288,881	2.70	0.12	2.82	86.68	259.81	93.91
U.S. TOTALS	149,687,224	68,318,449	218,005,674	0.76	0.35	1.11	102.29	198.92	132.57

FEBRUARY 10, 1977
TABLE 10

1976 NEEDS SURVEY

ANALYSIS OF LIQUID EFFLUENT DISPOSAL

NUMBER OF RESPONSES

UNITED STATES TOTAL

CURRENT STATUS

IN OPERATION	UNDER CONSTRUCTION	REQUIRED, BUT NOT YET APPROVED OR FUNDED
16,574	457	8,406

******DISPOSAL METHOD******	********NATURE OF PROJECTED CHANGE********							***TOTAL***
	ENLARGE	UPGRADE	ENLARGE AND UPGRADE	NEW CONST.	REPLACE	ABANDON	NO CHANGE	OTHER	
OUTFALL TO SURFACE WATERS	725	355	653	5,295	295	1,816	8,427	251	17,821
OCEAN OUTFALL	27	11	11	187	11	61	186	4	418
HOLDING POND	78	17	35	411	25	77	526	39	1,212
DEEP WELL	3	0	0	38	0	2	6	0	49
GROUND WATER RECHARGE	33	9	12	131	5	27	125	8	346
OTHER LAND DISPOSAL	44	17	14	520	8	55	325	20	1,006
RECYCLING AND REUSE	10	1	3	73	0	11	24	5	127
SEPTIC TANK FIELD	7	1	4	32	497	622	97	19	1,191
OTHER	53	2	16	1,957	28	66	1,320	52	3,498
TOTAL	982	410	750	8,647	781	2,739	10,960	481	25,671

FEBRUARY 19, 1977
TABLE 11

1976 NEEDS SURVEY

REQUIRED INFILTRATION/INFLOW CORRECTIVE ACTIONS AND BASIS OF ESTIMATE
NUMBERS OF FACILITIES WITH NEEDS

BASIS OF ESTIMATE	CORRECTIVE ACTION							
	NOT KNOWN	NONE	SEAL OFF SEWER LINES	REPLACE/RELINE SEWER SECTIONS	CHANGE/CREATE FLOW ROUTING SYSTEM	PROVIDE FLOW EQUALIZATION	OTHER	TOTAL
STATE CERTIFICATION	2	0	0	0	0	0	0	2
I/I ANALYSIS COMPLETED	88	0	365	597	10	32	243	1,328
EVALUATION SURVEY COMPLETED	1	0	53	109	4	6	53	227
ENGINEER/CONSULTANT FIRM ESTIMATE	0	0	2	3	0	0	2	7
COST OF PREVIOUS COMPARABLE CONSTRUCTION	0	0	0	0	0	0	0	0
ENGINEER/CONSULTANT PRELIMINARY ESTIMATE	82	0	381	264	8	20	159	915
EPA - SUPPLIED COST ESTIMATING PROCEDURES	655	0	40	112	1	0	98	906
COST EFFECTIVE ANALYSIS	2	0	1	1	0	3	1	8
HUDUM ESTIMATE	312	0	0	0	0	0	0	312
(NONE GIVEN)	3,663	1	1	2	0	1	2	3,670
TOTALS	4,798	1	843	1,089	23	62	559	7,379

FEBRUARY 10, 1977
TABLE 12

1976 NEEDS SURVEY

DOLLAR NEEDS FOR REQUIRED INFILTRATION/INFLOW CORRECTIVE ACTIONS BY BASIS OF ESTIMATE
(THOUSANDS OF DOLLARS)

BASIS OF ESTIMATE	CORRECTIVE ACTION							
	NOT KNOWN	NONE	SEAL OFF SEWER LINES	REPLACE/ RELINE SEWER SECTIONS	CHANGE/ CREATE FLOW ROUT. SYSTEM	PROVIDE FLOW EQUILIZA.	OTHER	TOTAL
STATE CERTIFICATION	49	0	0	0	0	0	0	49
I/I ANALYSIS COMPLETED	20,762	0	289,903	771,817	15,769	24,017	159,657	1,192,325
EVALUATION SURVEY COMPLETED	288	0	39,258	124,838	10,674	2,582	29,375	206,935
ENGINEER/CONSULTANT FIRM EST.	0	0	789	819	0	0	393	1,831
COST OF PREVIOUS COMP. CONST.	0	0	0	0	0	0	0	0
ENG./CONSULTANT PRELIM. EST.	98,289	0	498,843	201,253	5,686	31,913	126,297	961,481
EPA-SUPPLIED COST EST. PROC.	443,197	0	12,807	84,670	3,182	0	36,884	549,789
COST EFFECTIVE ANALYSIS	282	0	1	25	0	1,289	279	1,876
MUUUH ESTIMATE	18,841	0	0	0	0	0	0	18,841
(NONE GIVEN)	88,888	3	230	859	0	1,231	311	83,538
TOTALS	662,596	3	789,759	1,184,081	35,231	60,952	344,826	3,016,648

FEBRUARY 10, 1977
TABLE 13

1976 NEEDS SURVEY

REQUIRED REPLACEMENT AND/OR MAJOR REHABILITATION ACTIONS AND BASIS OF ESTIMATE
NUMBERS OF FACILITIES WITH NEEDS

BASIS OF ESTIMATE	CORRECTIVE ACTION: NOT KNOWN	NONE	SEAL OFF SEWER LINES	REPLACE/RELINE SEWER SECTIONS	CHANGE/CREATE FLOW ROUTING SYSTEM	PROVIDE FLOW EQUALIZATION	OTHER	TOTAL
STATE CERTIFICATION	0	0	0	0	0	0	0	0
ANALYSIS COMPLETED	1	0	0	32	2	0	11	46
EVALUATION SURVEY COMPLETED	0	0	0	26	0	0	11	37
ENGINEER/CONSULTANT FIRM ESTIMATE	0	0	0	1	0	0	0	1
COST OF PREVIOUS COMPARABLE CONSTRUCTION	0	0	0	0	0	0	0	0
ENGINEER/CONSULTANT PRELIMINARY ESTIMATE	2	0	12	264	5	1	84	368
EPA - SUPPLIED COST ESTIMATING PROCEDURES	0	0	0	1	1	0	0	2
COST EFFECTIVE ANALYSIS	0	0	0	0	0	0	0	0
ROUGH ESTIMATE	1	0	0	0	0	0	0	1
(NONE GIVEN)	2	0	0	4	0	0	0	6
TOTALS	6	0	12	328	8	1	106	461

FEBRUARY 10, 1977
TABLE 14

1976 NEEDS SURVEY

DOLLAR NEEDS FOR REPLACEMENT AND/OR MAJOR REHABILITATION BY BASIS OF ESTIMATE
(THOUSANDS OF DOLLARS)

BASIS OF ESTIMATE	CORRECTIVE ACTION: NOT KNOWN	NONE	SEAL OFF SEWER LINES	REPLACE/ RELINE SEWER SECTIONS	CHANGE/ CREATE FLOW ROUT. SYSTEM	PROVIDE FLOW EQUILIZA.	OTHER	TOTAL
STATE CERTIFICATION	0	0	0	0	0	0	0	0
ANALYSIS COMPLETED	69	0	0	31,388	65,027	0	25,945	117,341
EVALUATION SURVEY COMPLETED	0	0	0	95,351	0	0	7,992	103,343
ENGINEER/CONSULTANT FIRM EST.	0	0	0	848	0	0	0	848
COST OF PREVIOUS COMP. CONST.	0	0	0	0	0	0	0	0
ENG./CONSULTANT PRELIM. EST.	488	0	8,658	4,751,678	63,385	48	435,744	5,259,987
EPA-SUPPLIED COST EST. PROC.	0	0	0	5	585	0	0	518
COST EFFECTIVE ANALYSIS	0	0	0	0	0	0	0	0
ROUGH ESTIMATE	141	0	0	0	0	0	0	141
(NONE GIVEN)	3,338	0	0	1,114	0	0	0	4,452
TOTALS	3,948	0	8,658	4,880,288	123,917	48	469,683	5,486,534

FEBRUARY 10, 1977
TABLE 15

1976 NEEDS SURVEY

STATE AVERAGE FLOWS
PRESENT, PROJECTED & PERCENT CHANGE
IN THOUSANDS OF CUBIC METERS PER DAY

STATE	PRESENT TOTAL FLOW	PRESENT IND. FLOW	PRESENT IND. %	PRESENT LITERS / CAP./DAY	PROJECTED TOTAL FLOW	PROJECTED IND. FLOW	PROJECTED IND. %	PROJECTED LITERS / CAP./DAY	PERCENT CHANGE TOTAL FLOW	PERCENT CHANGE IND. FLOW	PERCENT CHANGE LITERS / CAP./DAY
ALABAMA	1,515(400)	176(46)	11.6	452(172)	1,933(510)	266(70)	13.7	458(119)	+27.5	+51.0	-30.9
ALASKA	80(21)	14(3)	17.8	352(93)	312(82)	22(5)	7.2	547(144)	+288.2	+56.5	+55.2
ARIZONA	628(166)	28(7)	4.6	337(89)	1,266(328)	7(2)	0.6	433(114)	+97.9	-72.4	+28.5
ARKANSAS	572(151)	78(20)	13.7	486(128)	1,131(298)	136(36)	12.0	501(132)	+97.5	+73.3	+3.0
CALIFORNIA	8,486(2241)	1,274(336)	15.0	382(101)	12,823(3387)	2,160(570)	16.8	481(106)	+51.1	+69.4	+5.0
COLORADO	1,410(372)	190(50)	13.5	552(145)	2,426(641)	296(78)	12.2	546(144)	+72.0	+55.5	-1.1
CONNECTICUT	1,489(393)	262(69)	17.6	612(161)	2,204(598)	482(127)	21.2	518(137)	+52.0	+83.9	-15.2
DELAWARE	311(82)	139(36)	44.8	364(96)	596(157)	147(38)	24.6	431(114)	+91.3	+5.3	+18.4
DIST. OF COLUM	1,101(291)	0()	0.0	579(153)	1,169(309)	0()	0.0	525(138)	+6.1	+0.0	-9.4
FLORIDA	2,185(577)	131(34)	5.9	410(108)	6,098(1610)	254(67)	4.1	463(122)	+179.0	+94.3	+12.7
GEORGIA	2,070(546)	591(156)	28.5	465(122)	3,375(891)	788(208)	23.3	474(125)	+63.0	+33.4	+1.9
HAWAII	114(30)	8(2)	7.4	486(128)	680(179)	56(15)	8.3	492(130)	+492.6	+566.6	+1.1
IDAHO	271(71)	60(15)	22.3	648(171)	482(127)	96(25)	20.0	544(143)	+78.0	+59.7	-15.9
ILLINOIS	8,201(2166)	3,370(890)	41.0	464(122)	13,958(3687)	5,345(1412)	38.2	572(151)	+70.1	+58.6	+23.4
INDIANA	2,680(708)	633(167)	23.6	542(143)	4,626(1222)	1,128(298)	24.4	546(144)	+72.6	+78.1	+0.6
IOWA	1,314(347)	252(66)	19.1	461(121)	1,963(518)	465(122)	23.6	483(127)	+49.3	+84.5	+4.7
KANSAS	852(225)	124(32)	14.5	416(110)	1,330(351)	238(62)	17.8	440(116)	+56.0	+91.7	+5.7
KENTUCKY	865(228)	261(69)	30.2	479(126)	1,872(494)	529(139)	28.2	424(112)	+116.4	+102.3	-11.4
LOUISIANA	954(252)	34(9)	3.5	372(98)	2,178(575)	128(33)	5.8	509(134)	+128.1	+273.2	+36.8
MAINE	337(89)	79(21)	23.6	571(150)	568(144)	133(35)	24.3	513(135)	+62.3	+67.0	-10.0
MARYLAND	1,355(358)	202(53)	14.9	430(113)	2,624(693)	295(77)	11.2	439(116)	+93.6	+45.8	+2.1
MASSACHUSETTS	933(246)	297(78)	31.9	488(128)	2,294(606)	633(167)	27.6	536(141)	+145.7	+112.7	+9.3
MICHIGAN	5,868(1550)	1,230(325)	20.9	671(177)	9,144(2415)	1,807(477)	19.7	647(171)	+55.8	+46.8	-3.5
MINNESOTA	1,903(502)	597(157)	31.3	385(101)	2,858(755)	931(245)	32.5	425(112)	+50.1	+55.9	+10.1
MISSISSIPPI	1,587(419)	111(29)	6.9	1,267(334)	1,298(343)	192(50)	14.8	512(135)	-18.1	+73.2	-59.5
MISSOURI	2,182(576)	404(106)	18.5	424(112)	3,715(981)	800(211)	21.5	431(113)	+70.2	+97.7	+1.6
MONTANA	364(96)	14(3)	3.8	706(186)	470(124)	17(4)	3.6	571(151)	+28.9	+20.7	-19.0
NEBRASKA	583(154)	144(38)	24.7	399(105)	1,022(270)	344(91)	33.7	449(118)	+75.1	+138.7	+12.6
NEVADA	320(84)	0()	0.0	496(131)	963(249)	18(5)	2.0	797(210)	+194.8	+0.0	+60.5
NEW HAMPSHIRE	195(51)	46(12)	23.9	468(123)	476(125)	114(30)	24.1	467(123)	+143.8	+145.5	-0.3
NEW JERSEY	3,788(1000)	816(215)	21.5	461(121)	5,527(1460)	1,309(345)	23.6	388(102)	+45.9	+60.2	-15.8
NEW MEXICO	313(82)	19(5)	6.3	394(104)	622(164)	25(6)	4.1	442(116)	+98.1	+28.8	+12.0
NEW YORK	8,819(2329)	1,039(274)	11.7	481(127)	14,654(3871)	1,721(454)	11.7	543(143)	+66.1	+65.5	+13.0
NORTH CAROLINA	1,749(462)	665(175)	38.0	416(109)	3,044(804)	1,086(286)	35.6	398(105)	+74.0	+63.2	-4.3
NORTH DAKOTA	161(42)	15(4)	9.6	358(94)	221(58)	26(6)	11.9	384(101)	+37.0	+70.3	+7.2
OHIO	5,639(1489)	1,141(301)	20.2	525(138)	9,176(2424)	2,041(539)	22.2	529(139)	+62.7	+78.8	+0.7
OKLAHOMA	899(237)	66(17)	7.3	417(110)	1,477(390)	100(26)	6.8	477(126)	+64.2	+52.0	+14.2
OREGON	1,358(358)	171(45)	12.6	653(172)	2,080(549)	377(99)	18.1	465(122)	+53.1	+119.8	-28.8
PENNSYLVANIA	7,088(1872)	1,069(282)	15.0	624(164)	8,405(2220)	1,471(388)	17.5	473(125)	+18.5	+37.5	-24.0
RHODE ISLAND	352(93)	124(32)	35.2	552(145)	630(166)	191(50)	30.4	523(138)	+78.9	+54.4	-5.1
SOUTH CAROLINA	1,410(372)	305(80)	21.6	782(185)	1,934(510)	443(117)	22.9	446(117)	+37.0	+45.1	-36.4
SOUTH DAKOTA	184(48)	31(8)	17.2	399(105)	268(70)	40(10)	14.9	441(116)	+45.9	+28.7	+10.6
TENNESSEE	1,807(477)	466(123)	25.8	572(151)	2,786(736)	795(210)	28.5	509(134)	+54.1	+70.4	-11.0
TEXAS	4,802(1268)	531(140)	11.0	439(116)	8,774(2318)	648(171)	7.3	511(135)	+82.7	+21.8	+16.3
UTAH	808(213)	98(26)	12.1	678(179)	913(241)	120(31)	13.1	528(139)	+12.9	+22.0	-22.1
VERMONT	563(148)	17(4)	3.1	2,126(561)	255(67)	27(7)	10.6	550(145)	-54.7	+54.6	-74.1
VIRGINIA	1,360(359)	112(29)	8.2	404(106)	3,143(830)	404(106)	12.8	463(122)	+131.0	+260.4	+14.6
WASHINGTON	1,608(424)	172(45)	10.7	624(164)	3,141(829)	316(83)	10.0	673(177)	+95.2	+83.2	+7.8
WEST VIRGINIA	389(102)	64(17)	16.5	437(115)	943(249)	88(23)	9.3	472(124)	+142.0	+36.8	+7.9
WISCONSIN	2,225(587)	605(160)	27.2	518(136)	3,669(969)	1,096(289)	29.8	534(141)	+64.8	+80.9	+3.6
WYOMING	133(35)	0()	0.0	470(124)	261(68)	0()	0.0	482(127)	+95.8	+0.0	+2.5
AMERICAN SAMOA	1()	0()	0.0	967(255)	25(6)	10(2)	43.2	386(102)	+1356.5	+0.0	-60.0
GUAM	38(10)	0()	0.0	542(143)	104(27)	0()	0.0	368(97)	+174.7	+0.0	-31.9
PUERTO RICO	394(104)	54(14)	13.7	339(89)	1,309(345)	261(69)	19.9	379(100)	+231.9	+383.2	+11.7
PAC. TR. TERR.	1()	0()	0.0	344(90)	58(15)	0()	0.1	370(97)	+3001.9	+0.0	+7.7
VIRGIN ISLANDS	17(4)	0()	0.0	379(100)	43(11)	0()	0.0	407(107)	+140.4	+0.0	+7.4
U.S. TOTALS	96,662(25535)	18,354(4848)	18.9	493(130)	159,339(42093)	30,446(8043)	19.1	492(130)	+64.8	+65.8	-0.2

NOTES: 1. FLOWS IN CUBIC METERS X 1000 2. APPROXIMATE MGD IN PARENTHESES 3. SUM OF ENTRIES MAY NOT EQUAL TOTALS DUE TO ROUND-OFFS

1976 NEEDS SURVEY

FEBRUARY 10, 1977
TABLE 14

NUMBER AND PERCENT OF TREATMENT PLANTS BY FLOW

STATE	TOTAL NUMBER OF PLANTS	CUBIC METERS PER DAY (MILLION GALLONS PER DAY) 0-.40 (0-.105) # OF(% OF) PLANTS(PLANTS)	.401-4.0 (.106-1.05) # OF(% OF) PLANTS(PLANTS)	4.001-40 (1.06-10.5) # OF(% OF) PLANTS(PLANTS)	40.001-190 (10.57-50.2) # OF(% OF) PLANTS(PLANTS)	190+ (50.2+) # OF(% OF) PLANTS(PLANTS)
ALABAMA	311	138(44.52)	121(38.82)	42(13.44)	10(3.22)	0(0.00)
ALASKA	125	108(86.40)	13(10.40)	3(2.40)	1(0.69)	0(0.00)
ARIZONA	163	104(63.80)	47(28.83)	9(5.52)	2(1.23)	1(0.61)
ARKANSAS	429	259(60.40)	138(32.23)	31(7.13)	1(0.23)	0(0.00)
CALIFORNIA	801	381(47.57)	237(29.59)	154(19.23)	22(2.75)	7(0.87)
COLORADO	187	86(45.99)	71(37.97)	25(13.37)	3(1.60)	2(1.07)
CONNECTICUT	115	27(23.48)	37(32.17)	40(34.78)	11(9.57)	0(0.00)
DELAWARE	30	14(46.67)	14(46.67)	1(3.33)	0(0.00)	1(3.33)
DIST. OF COLUM.	1	0(0.00)	0(0.00)	0(0.00)	0(0.00)	1(100.00)
FLORIDA	326	85(26.08)	140(42.99)	92(28.17)	8(2.45)	1(0.31)
GEORGIA	593	328(55.37)	191(32.28)	62(10.50)	10(1.69)	1(0.17)
HAWAII	55	32(58.18)	14(25.45)	8(14.55)	0(0.00)	1(1.82)
IDAHO	91	62(68.13)	16(17.58)	11(12.09)	2(2.20)	0(0.00)
ILLINOIS	1,119	636(56.84)	363(32.44)	104(9.29)	13(1.16)	3(0.27)
INDIANA	481	260(54.05)	147(30.56)	59(12.27)	13(2.70)	2(0.42)
IOWA	1,098	778(70.13)	277(25.23)	46(4.19)	5(0.46)	0(0.00)
KANSAS	536	217(50.83)	173(40.55)	34(7.92)	3(0.70)	0(0.00)
KENTUCKY	328	197(60.06)	94(28.66)	34(10.37)	2(0.61)	1(0.30)
LOUISIANA	355	163(45.92)	130(36.62)	60(16.90)	2(0.56)	0(0.00)
MAINE	136	69(50.74)	43(31.62)	24(17.65)	0(0.00)	0(0.00)
MARYLAND	292	221(75.68)	49(16.78)	18(6.16)	3(1.03)	1(0.34)
MASSACHUSETTS	126	45(35.71)	38(30.16)	38(30.16)	5(3.97)	0(0.00)
MICHIGAN	393	123(31.30)	170(43.26)	83(21.12)	15(3.82)	2(0.51)
MINNESOTA	596	320(53.69)	226(37.92)	42(7.05)	7(1.17)	1(0.17)
MISSISSIPPI	214	61(28.50)	94(43.93)	52(24.30)	6(2.80)	1(0.47)
MISSOURI	770	489(63.51)	227(29.48)	46(5.97)	5(0.65)	3(0.39)
MONTANA	136	67(49.52)	46(33.88)	22(15.86)	1(0.74)	0(0.00)
NEBRASKA	322	236(73.09)	65(20.12)	19(5.86)	3(0.93)	0(0.00)
NEVADA	67	41(61.19)	19(28.36)	4(5.97)	3(4.48)	0(0.00)
NEW HAMPSHIRE	101	60(59.41)	25(24.75)	16(15.84)	0(0.00)	0(0.00)
NEW JERSEY	254	41(16.14)	113(44.49)	87(34.25)	9(3.54)	4(1.57)
NEW MEXICO	101	47(46.54)	43(42.58)	10(9.89)	1(0.99)	0(0.00)
NEW YORK	1,013	612(60.41)	256(25.27)	113(11.15)	17(1.68)	15(1.48)
NORTH CAROLINA	411	152(36.96)	165(40.19)	88(21.39)	6(1.46)	0(0.00)
NORTH DAKOTA	357	307(85.99)	39(10.92)	11(3.08)	0(0.00)	0(0.00)
OHIO	848	367(43.30)	320(37.71)	142(16.75)	12(1.42)	7(0.83)
OKLAHOMA	448	261(58.29)	144(32.14)	39(8.68)	4(0.89)	0(0.00)
OREGON	114	24(20.57)	32(27.56)	53(65.96)	6(5.04)	1(0.87)
PENNSYLVANIA	1,073	557(51.90)	322(29.98)	169(15.73)	17(1.61)	8(0.78)
RHODE ISLAND	22	9(40.91)	4(18.18)	8(36.36)	0(0.00)	1(4.55)
SOUTH CAROLINA	386	195(50.52)	131(33.94)	55(14.25)	4(1.04)	1(0.26)
SOUTH DAKOTA	144	91(62.82)	44(30.24)	8(5.55)	2(1.39)	0(0.00)
TENNESSEE	340	171(50.29)	115(33.82)	49(14.41)	2(0.59)	2(0.88)
TEXAS	999	338(33.81)	510(51.05)	130(13.04)	16(1.60)	5(0.50)
UTAH	116	35(30.17)	54(46.55)	22(18.97)	5(4.31)	0(0.00)
VERMONT	96	47(48.96)	37(38.54)	11(11.46)	0(0.00)	1(1.04)
VIRGINIA	644	498(76.09)	105(16.30)	37(5.75)	11(1.71)	1(0.16)
WASHINGTON	160	59(36.88)	56(35.00)	39(24.38)	4(2.50)	2(1.25)
WEST VIRGINIA	542	443(81.73)	80(14.76)	18(3.32)	1(0.18)	0(0.00)
WISCONSIN	609	348(57.14)	203(33.33)	48(7.88)	8(1.31)	2(0.33)
WYOMING	88	47(53.41)	35(48.49)	5(5.70)	0(0.00)	0(0.00)
AMERICAN SAMOA	6	5(83.33)	1(16.67)	0(0.00)	0(0.00)	0(0.00)
GUAM	7	4(57.14)	1(14.29)	2(28.57)	0(0.00)	0(0.00)
PUERTO RICO	34	7(20.59)	21(61.76)	4(11.76)	1(2.94)	1(2.94)
PAC. TR. TERR.	39	36(92.31)	3(7.69)	0(0.00)	0(0.00)	0(0.00)
VIRGIN ISLANDS	4	2(50.00)	0(0.00)	2(50.00)	0(0.00)	0(0.00)
U.S. TOTALS	19,041	10,293(54.06)	6,058(31.82)	2,326(12.22)	282(1.48)	81(0.43)

1976 NEEDS SURVEY

REMOVAL RATES AND STREAM LOADING FROM FACILITIES EXISTING IN 1976 IN METRIC TONS PER DAY ALL FACILITIES

STATE	FLOW	BODS INF.	BODS EFF.	BODS % REM.	SOLIDS INF.	SOLIDS EFF.	SOLIDS % REM.	PHOSPHORUS INFLUENT	PHOSPHORUS EFFLUENT	NH3 NITROGEN INFLUENT	NH3 NITROGEN EFFLUENT	OTHER INFLUENT	OTHER EFFLUENT
ALABAMA	1,332(351)	208	40	85.0	260	45	82.5			1			
ALASKA	75(20)	11	5	51.8	14	5	64.7						
ARIZONA	628(166)	129	20	84.2	149	20	86.5						
ARKANSAS	572(151)	152	25	83.5	187	31	81.1						
CALIFORNIA	8,486(2236)	2,239	872	61.1	2,516	784	69.6	44	10	38	38	29	9
COLORADO	1,409(372)	323	90	71.9	291	78	73.2			16	10		
CONNECTICUT	1,421(375)	215	63	70.3	216	58	73.2						
DELAWARE	311(82)	53	8	84.2	58	16	72.6						
DIST. OF COLUM.	1,101(290)	198	41	78.9	198	41	78.9	8	3	15	15		
FLORIDA	2,037(538)	405	73	81.8	384	81	78.9	3	3	3	1		
GEORGIA	2,024(534)	434	79	81.6	404	99	75.4	1	1	1	1		
HAWAII	114(30)	20	4	51.7	23	9	57.7						
IDAHO	266(70)	75	12	84.1	66	10	84.3			1			
ILLINOIS	8,059(2129)	1,310	138	89.4	1,593	156	90.1	3	2	104	56		
INDIANA	2,679(707)	449	61	86.4	534	78	86.8	6	4	19	11		
IOWA	1,313(346)	478	124	73.9	426	95	77.7			9	6	3	2
KANSAS	851(225)	198	55	71.9	214	48	77.4						
KENTUCKY	789(208)	176	41	77.0	189	40	78.9	4	4	10	9		
LOUISIANA	953(251)	176	51	70.9	188	54	70.8						
MAINE	312(82)	71	21	70.1	78	20	71.6						
MARYLAND	1,355(358)	289	85	70.5	248	78	71.7	6	5				
MASSACHUSETTS	933(246)	192	60	68.8	182	48	73.6						
MICHIGAN	5,764(1516)	1,076	213	80.1	1,448	297	79.4	46	26	9	6	33	4
MINNESOTA	1,892(499)	456	106	76.7	561	120	78.6	3	2	13	9	1	1
MISSISSIPPI	1,579(417)	266	70	73.3	335	133	60.2			4	3		
MISSOURI	2,142(570)	495	222	55.1	552	169	69.4						
MONTANA	364(96)	82	27	55.5	48	19	59.2						
NEBRASKA	583(154)	204	91	65.3	223	76	65.6					21	13
NEVADA	117(83)	67	5	91.3	69	6	90.4						
NEW HAMPSHIRE	143(38)	45	17	60.5	45	13	70.0						
NEW JERSEY	3,788(1000)	946	522	44.8	811	298	63.2			7	6		
NEW MEXICO	313(82)	78	17	74.8	63	13	78.7						
NEW YORK	8,799(2324)	1,282	515	59.2	1,231	474	61.5	6	5	5	3	13	3
NORTH CAROLINA	1,827(429)	495	59	85.3	534	63	88.9			3	2		
NORTH DAKOTA	161(42)	42	3	91.0	38	5	85.6						
OHIO	5,838(1487)	961	261	72.8	1,131	226	80.0	36	24	32	27	17	5
OKLAHOMA	899(237)	184	34	81.0	222	39	82.2						
OREGON	1,358(358)	253	64	74.7	255	49	80.6						
PENNSYLVANIA	7,019(1854)	1,266	274	78.3	1,485	338	77.8	6	3	11	5	449	39
RHODE ISLAND	352(93)	48	20	57.8	46	20	55.5						
SOUTH CAROLINA	1,378(364)	460	81	82.4	275	81	70.5						
SOUTH DAKOTA	183(48)	49	7	84.3	45	7	84.4			3	2		
TENNESSEE	1,454(384)	349	86	75.2	437	86	80.1	1	1	6	4		
TEXAS	4,729(1249)	998	134	86.4	1,048	193	81.5						
UTAH	808(213)	112	17	84.3	154	20	86.7						
VERMONT	543(144)	109	15	85.9	107	11	89.3	1					
VIRGINIA	1,357(358)	258	65	74.5	245	52	78.4						
WASHINGTON	1,888(424)	387	156	48.9	318	104	67.2			1	1		
WEST VIRGINIA	389(102)	62	32	60.8	86	30	64.8			1	1		
WISCONSIN	2,215(585)	517	97	81.1	548	112	79.4	10	3	3	3	7	5
WYOMING	133(35)	25	8	68.9	24	9	63.2						
AMERICAN SAMOA	0(0)	0	0	20.0	0	0	30.0						
GUAM	38(10)	8	8	4.3	8	8	5.0						
PUERTO RICO	394(104)	82	48	41.4	84	33	60.8						
PAC. TR. TERR.	1(0)	0	0	58.8	0	0	65.6						
VIRGIN ISLANDS	17(4)	2	1	36.2	3	1	65.2						
U.S. TOTALS	95,068(25109)	19,383	5,248	72.92	0,669	4,955	76.0	184	96	315	219	573	77

NOTES: 1. FLOWS IN CUBIC METERS X 1000 2. APPROXIMATE MGD IN PARENTHESES 3. METRIC TONS X .9072 = SHORT TONS

FEBRUARY 10, 1977
TABLE 17A

1976 NEDS SURVEY

REMOVAL RATES AND STREAM LOADING
FROM FACILITIES EXISTING IN 1976
FACILITIES PROVIDING LESS THAN SECONDARY TREATMENT
IN METRIC TONS PER DAY

STATE	FLOW	BOD5 INF.	BOD5 EFF.	BOD5 % REM.	SUSPENDED SOLIDS INF.	SUSPENDED SOLIDS EFF.	SUSPENDED SOLIDS % REM.	** PHOSPHORUS *** INFLUENT	** PHOSPHORUS *** EFFLUENT	* NH3 NITROGEN * INFLUENT	* NH3 NITROGEN * EFFLUENT	***** OTHER ***** INFLUENT	***** OTHER ***** EFFLUENT
ALABAMA	368(97)	66	19	71.1	61	21	65.5						
ALASKA	82(10)	9	5	44.2	12	6	53.5						
ARIZONA	205(54)	50	13	74.0	48	18	78.3						
ARKANSAS	295(78)	72	18	74.9	82	22	84.7						
CALIFORNIA	5.166(1364)	1.387	398	42.6	1.601	686	57.2						
COLORADO	1.048(278)	224	79	64.7	290	99	88.9						
CONNECTICUT	366(169)	98	48	50.7	96	38	58.4						
DELAWARE	261(76)	84	8	81.7	50	15	87.8						
DIST. OF COLUM.	1.101(290)	198	61	78.9	198	61	78.9						
FLORIDA	707(187)	113	52	53.2	126	58	55.1						
GEORGIA	1.001(264)	218	52	75.8	199	78	84.7						
HAWAII	74(20)	14	9	33.8	15	8	46.3						
IDAHO	126(33)	31	8	73.8	28	7	74.8						
ILLINOIS	703(185)	127	41	52.1	184	83	88.3						
INDIANA	551(145)	85	25	70.3	123	31	74.7						
IOWA	867(234)	323	116	83.1	286	81	71.5						
KANSAS	498(131)	98	43	55.1	181	38	83.7						
KENTUCKY	332(87)	73	29	88.5	78	27	83.8						
LOUISIANA	511(135)	95	41	58.8	189	44	88.9						
MAINE	88(22)	23	10	52.5	23	14	39.4						
MARYLAND	1.098(290)	232	81	84.8	199	86	88.7						
MASSACHUSETTS	456(119)	87	49	44.8	78	38	52.9						
MICHIGAN	4.219(1114)	658	184	78.5	1.174	262	77.7						
MINNESOTA	531(140)	99	62	37.3	180	78	56.5						
MISSISSIPPI	1.011(267)	198	81	84.3	228	113	50.1						
MISSOURI	1.742(460)	387	210	45.7	489	193	88.1						
MONTANA	254(67)	48	25	48.8	38	18	38.4						
NEBRASKA	388(102)	287	83	56.7	188	78	57.3						
NEVADA	28(7)	5	1	72.2	5	1	78.8						
NEW HAMPSHIRE	140(37)	27	16	40.1	30	11	88.8						
NEW JERSEY	3.268(847)	837	510	39.8	714	287	59.7						
NEW MEXICO	147(38)	37	13	84.9	31	8	74.1						
NEW YORK	3.882(1485)	842	455	45.2	778	399	48.7						
NORTH CAROLINA	594(154)	154	42	72.7	119	35	70.4						
NORTH DAKOTA	28(7)	5	1	78.9	5	2	93.8						
OHIO	2.359(821)	487	298	49.4	421	138	84.7						
OKLAHOMA	402(104)	78	22	78.8	89	28	78.3						
OREGON	473(123)	79	43	45.8	79	28	84.8						
PENNSYLVANIA	3.187(841)	588	197	65.2	785	250	88.5						
RHODE ISLAND	299(79)	38	18	48.5	38	19	47.8						
SOUTH CAROLINA	995(263)	328	87	79.5	185	89	82.2						
SOUTH DAKOTA	89(23)	20	5	74.8	20	5	73.8						
TENNESSEE	810(214)	126	38	55.5	173	59	88.3						
TEXAS	1.697(478)	418	87	79.8	488	134	72.8						
UTAH	72(19)	11	3	74.7	12	3	74.7						
VERMONT	115(30)	23	14	37.5	21	10	58.5						
VIRGINIA	559(147)	193	51	88.9	98	38	83.3						
WASHINGTON	1.325(350)	258	131	48.4	258	98	81.8						
WEST VIRGINIA	295(78)	83	38	51.8	89	28	88.8						
WISCONSIN	708(238)	288	75	82.5	223	78	85.1						
WYOMING	118(38)	21	8	82.3	28	8	87.2						
AMERICAN SAMOA	8(2)	8	8	28.8	8	8	58.8						
GUAM	38(9)	8	7	8.8	8	8	1.1						
PUERTO RICO	378(98)	78	47	38.1	78	16	88.2						
VAL. IN. TERR.	11(3)	8	8	48.3	8	8	58.8						
VIRGIN ISLANDS	1(18)	2	1	38.2	3	1	88.2						
U.S. TOTALS	47.884(12852)	10.177	4.388	57.2	18.718	3.927	83.8						

NOTES: 1. FLOWS IN CUBIC METERS X 1000 2. APPROXIMATE MGD IN PARENTHESES 3. METRIC TONS X .9872 = SHORT TONS

NOTE : PHOSPHORUS AND NH3 NITROGEN NOT REMOVED BY THIS TYPE TREATMENT PROCESS

Reproduced from best available copy.

1976 NEEDS SURVEY

REMOVAL RATES AND STREAM LOADING
FROM FACILITIES EXISTING IN 1976
FACILITIES PROVIDING SECONDARY TREATMENT
IN METRIC TONS PER DAY

STATE	FLOW	BOD5 INF.	BOD5 EFF.	BOD5 % REM.	SOLIDS INF.	SOLIDS EFF.	SOLIDS % REM.	PHOSPHORUS INFLUENT	PHOSPHORUS EFFLUENT	NH3 NITROGEN INFLUENT	NH3 NITROGEN EFFLUENT	OTHER INFLUENT	OTHER EFFLUENT
ALABAMA	954(172)	126	17	85.9	136	21	84.5						
ALASKA	12(4)	1	0	73.5	1	0	73.6						
ARIZONA	177(44)	36	3	89.3	43	5	87.8						
ARKANSAS	114(38)	36	3	89.5	25	4	82.7						
CALIFORNIA	1,421(348)	295	37	85.1	279	41	85.0						
COLORADO	283(75)	74	10	86.0	67	9	85.3			*	*		
CONNECTICUT	828(109)	73	11	83.8	75	16	78.8			2	1		
DELAWARE	4(1)	0	0	90.2	0	0	80.0						
DIST. OF COLUM.	0(1)	0	0	0.0	0	0	0.0						
FLORIDA	251(86)	59	8	86.5	46	7	83.5						
GEORGIA	852(225)	175	23	86.9	163	25	84.4						
HAWAII	26(5)	3	0	88.5	3	0	85.4						
IDAHO	93(14)	14	1	88.3	12	1	88.6						
ILLINOIS	754(139)	115	14	87.5	127	19	85.0			1			
INDIANA	852(225)	109	17	84.3	121	17	85.4	2	1	12	3		
IOWA	247(65)	36	7	88.2	58	8	85.1			6	3		
KANSAS	351(92)	61	11	86.4	88	11	88.8			2	2		
KENTUCKY	377(99)	98	11	87.6	99	11	88.8	4	3	6	6		
LOUISIANA	298(78)	53	8	83.2	49	7	84.7						
MAINE	151(40)	28	3	88.8	24	4	83.6						
MARYLAND	79(20)	13	1	88.7	13	2	84.4						
MASSACHUSETTS	314(83)	68	8	88.8	59	8	85.2						
MICHIGAN	959(253)	127	22	82.8	155	27	82.3	10	5	3	2	19	3
MINNESOTA	1,013(267)	243	36	84.1	247	38	87.1			11	8		
MISSISSIPPI	383(132)	47	8	82.8	83	17	78.1						
MISSOURI	370(97)	80	10	87.5	71	11	84.2						
MONTANA	92(24)	9	1	82.4	8	1	82.7						
NEBRASKA	68(18)	16	2	86.8	12	2	83.4						
NEVADA	17(4)	3	0	88.3	3	0	86.0					2	
NEW HAMPSHIRE	29(8)	5	0	88.1	5	0	85.8						
NEW JERSEY	673(172)	98	8	85.6	37	6	83.0						
NEW MEXICO	140(34)	29	4	85.4	28	4	84.4			1			
NEW YORK	2,428(604)	476	67	82.7	292	80	79.3						
NORTH CAROLINA	496(130)	121	11	90.6	92	20	78.2					2	2
NORTH DAKOTA	31(8)	11	1	87.2	9	1	82.1						
OHIO	1,297(342)	224	31	86.1	211	38	87.6	9	2	2	1	7	2
OKLAHOMA	261(69)	38	7	86.3	68	8	88.3						
OREGON	829(186)	129	16	86.9	195	16	83.9						
PENNSYLVANIA	1,817(427)	298	48	84.3	334	48	85.5	2	1	1			
RHODE ISLAND	51(13)	11	1	87.2	9	1	84.9						
SOUTH CAROLINA	238(62)	48	9	86.3	48	8	82.7						
SOUTH DAKOTA	29(8)	6	0	88.4	5	0	83.2						
TENNESSEE	499(131)	153	25	83.8	191	42	86.1			2	1		
TEXAS	908(240)	185	22	87.8	139	25	85.0						
UTAH	479(126)	99	10	89.9	92	11	81.7	5					
VERMONT	28(7)	3	0	83.5	3	0	80.5						
VIRGINIA	298(54)	55	5	89.4	45	6	83.4						
WASHINGTON	162(42)	19	3	84.4	21	2	85.8						
WEST VIRGINIA	32(8)	6	0	85.4	6	0	86.7						
WISCONSIN	471(69)	17	2	88.6	15	2	83.8						
WYOMING	5(1)	1	0	85.7	1	0	87.0						
AMERICAN SAMOA	0(1)	0	0	0.0	0	0	0.0						
GUAM	0(1)	0	0	0.0	0	0	0.0						
PUERTO RICO	18(4)	5	0	93.8	4	0	88.1						
PAC. TR. TERR.	0(1)	0	0	88.0	0	0	88.0						
VIRGIN ISLANDS	0(1)	0	0	0.0	0	0	0.0						
U.S. TOTALS	29,081(7436)	3,780	510	86.4	3,990	591	85.2	27	12	53	31	30	7

NOTES: 1. FLOWS IN CUBIC METERS X 1000 2. APPROXIMATE MGD IN PARENTHESES 3. METRIC TONS X .9072 = SHORT TONS

1976 NEEDS SURVEY

REMOVAL RATES AND STREAM LOADING
FROM FACILITIES EXISTING IN 1976
FACILITIES PROVIDING GREATER THAN SECONDARY TREATMENT
IN METRIC TONS PER DAY

STATE	FLOW	**** BOD5 **** INF.	EFF.	% REM.	**** SOLIDS **** INF.	EFF.	% REM.	** PHOSPHORUS *** INFLUENT	EFFLUENT	* NH3 NITROGEN * INFLUENT	EFFLUENT	***** OTHER ***** INFLUENT	EFFLUENT
ALABAMA	311(82)	75	3	95.7	61	3	95.0						
ALASKA	0(0)	0	0	93.3	0	0	91.7						
ARIZONA	246(64)	42	3	92.0	57	4	92.5						
ARKANSAS	162(42)	48	3	92.4	79	5	93.5						
CALIFORNIA	2,936(537)	595	39	94.8	636	36	94.3	1	1	13	11	16	1
COLORADO	78(20)	24	1	95.2	23	1	92.2						
CONNECTICUT	230(60)	42	3	92.7	48	3	92.4						
DELAWARE	25(6)	8	0	96.8	7	0	91.6						
DIST. OF COLUM.	0(0)	0	0	0.0	0	0	0.0						
FLORIDA	1,076(284)	233	14	94.0	211	16	92.2	2	2	1			
GEORGIA	171(45)	42	3	92.3	41	3	91.1						
HAWAII	15(4)	3	0	93.7	3	0	89.5						
IDAHO	88(23)	33	1	96.2	24	1	93.0						
ILLINOIS	6,802(1744)	1,067	62	94.1	1,301	72	94.4						
INDIANA	1,275(336)	255	18	92.7	289	21	92.5	2	1	91	53		
IOWA	178(47)	98	4	95.8	81	4	93.9			13	8		
KANSAS	91(24)	20	1	93.1	23	1	92.8			3	1		
KENTUCKY	70(18)	14	0	94.2	13	1	91.6						
LOUISIANA	143(37)	28	1	95.1	28	2	91.7			1			
MAINE	74(19)	19	1	96.9	22	1	92.6						
MARYLAND	177(46)	43	2	95.2	35	2	94.4						
MASSACHUSETTS	164(43)	44	2	93.4	45	3	93.8						
MICHIGAN	562(148)	98	7	91.6	114	7	93.2	3	3	1	1		
MINNESOTA	348(92)	116	5	94.9	103	5	94.6	1		2	1		
MISSISSIPPI	64(17)	28	1	90.8	26	2	90.5						
MISSOURI	99(26)	27	1	92.9	22	2	90.4						
MONTANA	17(4)	3	0	99.7	3	0	99.7						
NEBRASKA	125(33)	49	3	90.5	44	3	91.6						
NEVADA	273(72)	59	4	93.2	61	4	92.9					3	
NEW HAMPSHIRE	17(4)	12	0	95.1	9	0	91.7						
NEW JERSEY	385(88)	68	4	92.2	61	4	92.0						
NEW MEXICO	17(4)	3	0	91.1	3	0	90.1			1	1		
NEW YORK	890(235)	152	11	92.4	160	14	90.8			2	1	9	1
NORTH CAROLINA	548(144)	129	9	93.4	122	8	93.3						
NORTH DAKOTA	101(26)	24	0	98.8	23	1	93.0						
OHIO	1,978(522)	329	23	92.8	399	31	92.2	10	6	10	9	1	
OKLAHOMA	235(62)	51	4	90.6	64	5	92.2						
OREGON	253(67)	52	3	92.6	70	4	93.9						
PENNSYLVANIA	2,214(585)	401	30	92.4	445	31	93.0	2	1	4	1	449	39
RHODE ISLAND	1(0)	0	0	93.9	0	0	93.9						
SOUTH CAROLINA	145(38)	51	4	91.9	50	4	91.3						
SOUTH DAKOTA	68(18)	22	1	92.6	18	0	96.9						
TENNESSEE	339(89)	69	4	92.9	70	4	92.9			2	2		
TEXAS	2,923(536)	367	24	93.7	397	31	92.2						
UTAH	256(67)	41	4	89.0	89	6	92.4						
VERMONT	419(110)	82	0	99.7	82	0	99.6						
VIRGINIA	589(155)	97	8	91.6	100	9	90.2						
WASHINGTON	160(42)	32	1	96.1	36	2	93.4						
WEST VIRGINIA	61(16)	12	0	98.4	10	1	89.3			1	1		
WISCONSIN	1,213(320)	299	20	93.2	389	32	89.8			1			
WYOMING	13(3)	2	0	96.1	3	0	91.1	5	1	2	2	4	4
AMERICAN SAMOA	0(0)	0	0	0.0	0	0	0.0						
GUAM	2(0)	0	0	92.7	0	0	96.3						
PUERTO RICO	1(0)	0	0	90.0	0	0	88.6						
PAC. TR. TERR.	0(0)	0	0	0.0	0	0	0.0						
VIRGIN ISLANDS	0(0)	0	0	0.0	0	0	0.0						
U.S. TOTALS	28,522(7806)	5,392	324	94.0	5,913	389	93.4	26	15	148	92	482	45

NOTES: 1. FLOWS IN CUBIC METERS X 1000 2. APPROXIMATE MGD IN PARENTHESES 3. METRIC TONS X .9072 = SHORT TONS

FEBRUARY 10, 1977
TABLE 18

1976 NEEDS SURVEY

REMOVAL RATES AND STREAM LOADING FROM FACILITIES PROJECTED FOR 1990 IN METRIC TONS PER DAY ALL FACILITIES

STATE	FLOW	BOD INF.	BOD EFF.	BOD % REM.	SOLIDS INF.	SOLIDS EFF.	SOLIDS % REM.	PHOSPHORUS INFLUENT	PHOSPHORUS EFFLUENT	NH3 NITROGEN INFLUENT	NH3 NITROGEN EFFLUENT	OTHER INFLUENT	OTHER EFFLUENT
ALABAMA	1,932(510)	425	43	89.7	428	48	88.8						
ALASKA	31(8)	44	8	83.8	54	8	85.4			5	3		
ARIZONA	1,249(330)	278	28	89.5	292	34	88.1						
ARKANSAS	1,131(298)	287	29	93.0	230	24	90.5						
CALIFORNIA	12,623(3336)	3,895	307	92.1	3,931	308	92.1	14	1	89	9	79	4
COLORADO	2,426(641)	632	105	83.4	611	98	85.6			29	4		
CONNECTICUT	2,128(562)	432	87	80.4	439	93	89.4	2		2			
DELAWARE	548(157)	149	7	94.8	137	11	91.9	1		1			
DIST. OF COLUM.	1,169(308)	280	5	97.9	280	8	97.1	8		15	1		
FLORIDA	3,809(1010)	1,385	125	90.9	1,416	109	92.3	20	4	9			
GEORGIA	3,374(891)	857	85	92.3	733	92	87.4	9		31	5	2	9
HAWAII	659(174)	174	19	89.3	148	16	89.0						
IDAHO	482(127)	123	13	89.0	117	14	87.9			1			
ILLINOIS	13,958(3687)	2,321	175	92.4	3,214	284	93.0	7	1	193	65	4	
INDIANA	4,593(1213)	987	43	95.6	1,140	41	96.3	13	1	43	4		
IOWA	1,983(516)	730	43	94.2	598	51	91.3			21	4	43	
KANSAS	1,421(369)	331	38	88.3	367	38	89.4						
KENTUCKY	1,867(494)	443	44	89.9	482	48	90.0	11	7	23	13		1
LOUISIANA	2,017(535)	508	59	88.3	514	60	88.2						
MAINE	548(144)	132	17	87.0	133	16	87.4						
MARYLAND	2,824(693)	653	30	95.1	573	38	93.2	16	3	20	2		
MASSACHUSETTS	2,249(608)	508	58	89.0	518	59	88.5	5		6			
MICHIGAN	9,139(2414)	1,870	187	90.0	2,442	224	90.8	89	12	22	2	68	5
MINNESOTA	2,858(755)	869	39	95.5	888	45	94.8	9		27	5	1	
MISSISSIPPI	1,249(343)	278	24	91.4	297	34	88.3			2			1
MISSOURI	3,715(981)	837	108	87.0	885	108	87.7						
MONTANA	470(124)	85	13	83.7	88	13	84.2						
NEBRASKA	1,022(270)	399	32	91.8	394	32	91.7						
NEVADA	943(249)	143	14	89.9	140	11	91.6	6				17	2
NEW HAMPSHIRE	478(126)	134	12	90.7	137	12	90.9			1			
NEW JERSEY	5,527(1460)	1,031	133	91.8	1,082	134	91.9	6		28	2	2	7
NEW MEXICO	662(164)	149	16	87.7	123	16	85.1	1		1			
NEW YORK	14,654(3871)	2,672	293	89.0	2,909	316	89.1	24	2	39	2	185	24
NORTH CAROLINA	3,344(884)	839	48	94.2	724	86	88.1	1		6	1		3
NORTH DAKOTA	221(58)	62	5	91.4	59	6	89.2						
OHIO	9,184(2427)	1,938	111	94.2	2,225	125	94.4	84	7	131	12	25	5
OKLAHOMA	1,477(390)	352	29	91.5	394	42	89.1	1					
OREGON	2,038(539)	504	40	92.1	478	49	91.0						
PENNSYLVANIA	8,443(2229)	1,777	178	90.1	1,949	208	89.4	25	4	46	6	724	45
RHODE ISLAND	630(166)	156	15	90.0	148	15	89.5						
SOUTH CAROLINA	1,934(510)	583	46	92.0	470	50	89.3						1
SOUTH DAKOTA	298(79)	80	5	93.3	76	6	92.1						
TENNESSEE	2,788(736)	783	58	92.4	783	85	91.7			4			
TEXAS	8,774(2317)	1,961	143	96.7	2,005	119	94.0			17	4		2
UTAH	913(241)	179	8	95.1	195	8	95.5	2		29	7		
VERMONT	253(67)	53	6	87.3	51	8	86.8	1					
VIRGINIA	3,143(830)	716	59	91.7	710	61	91.3	9		2			
WASHINGTON	3,191(842)	778	82	89.4	844	89	89.4			1		1	
WEST VIRGINIA	943(249)	216	22	89.8	214	22	89.5			10	1		
WISCONSIN	3,868(963)	843	82	90.2	909	80	91.1	19	2	2		2	
WYOMING	281(68)	54	7	85.8	55	7	85.8			9	1	44	5
AMERICAN SAMOA	25(6)	8	8	90.7	3	0	80.5						
GUAM	104(27)	21	2	87.8	24	2	88.9						
PUERTO RICO	1,430(1,365)	383	38	89.4	338	38	88.7						
PAC. TR. TERR.	58(15)	14	1	88.8	14	1	88.1						
VIRGIN ISLANDS	43(11)	9	1	87.0	12	1	89.3						
U.S. TOTALS	139,234(42,065)	30,724	3,134	91.5	39,020	3,402	91.3	383	44	837	173	1,177	114

NOTES: 1. FLOWS IN CUBIC METERS X 1000 2. APPROXIMATE MGD IN PARENTHESES 3. METRIC TONS X .9072 = SHORT TONS

1976 NEEDS SURVEY

REMOVAL RATES AND STREAM LOADING
FROM FACILITIES PROJECTED FOR 1990
FACILITIES PROVIDING SECONDARY TREATMENT
IN METRIC TONS PER DAY

STATE	FLOW	BOD5 INFL.	BOD5 EFFL.	BOD5 % REM.	SOLIDS INFL.	SOLIDS EFFL.	SOLIDS % REM.	PHOSPHORUS INFLUENT	PHOSPHORUS EFFLUENT	NH3 NITROGEN INFLUENT	NH3 NITROGEN EFFLUENT	OTHER INFLUENT	OTHER EFFLUENT
ALABAMA	1,697(1,603)	210	30	85.7	222	32	85.7						
ALASKA	209(197)	47	6	87.2	54	8	84.7			1	1		
ARIZONA	347(327)	100	17	83.3	134	17	87.1						
ARKANSAS	472(446)	110	14	86.8	106	14	86.7						
CALIFORNIA	3,804(3,593)	397	113	87.3	434	111	85.9						
COLORADO	809(764)	151	20	86.3	144	21	85.4	0		20	5	23	
CONNECTICUT	1,491(1,408)	300	54	82.0	171	33	80.7			5	1		
DELAWARE	0(0)	0	0	85.0	0	0	85.0						
DIST. OF COLUM.	0(0)	0	0	0.0	0	0	0.0						
FLORIDA	1,578(1,490)	310	45	85.7	310	39	87.3						
GEORGIA	1,478(1,396)	264	34	90.4	280	36	87.4						
HAWAII	296(280)	88	8	91.4	88	9	89.7			3		2	2
IDAHO	375(354)	78	10	86.7	83	11	86.4						
ILLINOIS	4,111(3,881)	83	10	87.0	88	11	85.5			1			
INDIANA	1,177(1,110)	97	12	86.9	100	13	87.0	1					
IOWA	818(772)	124	17	85.7	130	19	84.1						
KANSAS	867(818)	101	15	85.1	110	16	85.5			5	1		
KENTUCKY	761(718)	100	22	88.0	105	22	88.3						
LOUISIANA	1,438(1,357)	267	39	85.1	283	39	85.9	5	3	1	0		
MAINE	349(329)	74	12	84.4	79	11	85.1						
MARYLAND	18(17)	3	0	85.5	4	0	88.0						
MASSACHUSETTS	1,855(1,747)	320	48	85.5	333	49	85.2						
MICHIGAN	9,123(8,617)	1,000	154	85.4	1,745	140	87.7	1		1			
MINNESOTA	998(942)	143	13	88.8	127	16	86.9	44	5	6		19	3
MISSISSIPPI	488(460)	92	11	87.5	109	14	86.7	1		3			
MISSOURI	3,493(3,298)	734	102	86.0	807	102	87.3						
MONTANA	448(423)	80	13	83.3	82	13	83.7						
NEBRASKA	150(142)	35	4	88.4	36	4	88.1						
NEVADA	249(235)	19	5	73.0	21	2	87.9	3				4	
NEW HAMPSHIRE	238(224)	54	7	86.8	54	7	87.0						
NEW JERSEY	997(941)	235	29	87.3	242	29	87.8						
NEW MEXICO	317(299)	129	17	86.7	112	17	84.7	1		1			
NEW YORK	8,939(8,438)	1,130	153	85.6	1,242	172	86.1	6					
NORTH CAROLINA	1,491(1,407)	199	19	88.4	142	21	84.8						
NORTH DAKOTA	149(140)	26	4	84.9	22	3	83.5						
OHIO	3,731(3,521)	165	17	88.0	133	19	86.2	5		6	1	1	
OKLAHOMA	549(518)	62	7	88.5	83	8	88.3						
OREGON	1,501(1,415)	120	15	87.3	122	15	87.5						
PENNSYLVANIA	3,993(3,767)	803	98	93.6	735	99	88.4	0	1	8	1	719	45
RHODE ISLAND	388(366)	96	11	87.4	83	11	88.8						
SOUTH CAROLINA	848(800)	145	24	87.0	172	24	88.0						
SOUTH DAKOTA	98(92)	22	2	89.2	20	2	89.5						
TENNESSEE	1,188(1,121)	97	12	88.7	99	13	88.5						
TEXAS	2,421(2,284)	44	5	90.5	45	5	87.8						
UTAH	0(0)	0	0	0.0	0	0	0.0						
VERMONT	212(200)	42	5	85.1	42	5	85.0						
VIRGINIA	1,419(1,339)	281	34	88.7	295	34	88.4			1			
WASHINGTON	1,679(1,583)	334	53	85.1	387	53	86.3						
WEST VIRGINIA	369(348)	114	18	85.4	116	17	85.3						
WISCONSIN	1,621(1,529)	278	35	87.0	278	35	86.9	4					
WYOMING	269(253)	51	7	85.3	51	7	85.5						
AMERICAN SAMOA	2(2)	0	0	98.7	0	0	80.5						
GUAM	49(46)	9	1	85.4	11	1	86.7						
PUERTO RICO	848(800)	170	20	87.4	167	20	87.7						
PAC. TR. TERR.	26(25)	13	1	98.3	13	1	87.5						
VIRGIN ISLANDS	43(41)	9	1	87.0	12	1	89.3						
U.S. TOTALS	52,693(49,729)	10,020	1,441	86.4	11,841	1,490	87.2	87	9	83	16	768	50

NOTES: 1. FLOWS IN CUBIC METERS X 1000 2. APPROXIMATE MGD IN PARENTHESES 3. METRIC TONS X .9072 = SHORT TONS

Reproduced from best available copy.

FEBRUARY 10, 1977
TABLE 100

1976 NEEDS SURVEY

REMOVAL RATES AND STREAM LOADING
FROM FACILITIES PROJECTED FOR 1990
FACILITIES PROVIDING GREATER THAN SECONDARY TREATMENT
IN METRIC TONS PER DAY

STATE	FLOW	BOD5 INF.	BOD5 EFF.	BOD5 % REM.	SOLIDS INF.	SOLIDS EFF.	SOLIDS % REM.	** PHOSPHORUS INFLUENT	** PHOSPHORUS EFFLUENT	*** NH3 NITROGEN INFLUENT	*** NH3 NITROGEN EFFLUENT	***** OTHER INFLUENT	***** OTHER EFFLUENT
ALABAMA	858(226)	287	13	93.7	295	16	91.9			6	1		
ALASKA	15(4)	2	0	93.6	2	0	93.1						
ARIZONA	646(170)	123	11	90.9	153	16	89.0						
ARKANSAS	659(174)	169	9	94.5	149	10	93.2						
CALIFORNIA	9,995(2,639)	2,992	193	93.5	2,992	195	93.5	5	1	49	4	55	3
COLORADO	1,338(353)	349	28	91.7	332	28	91.5			24	3		
CONNECTICUT	257(67)	57	3	93.8	52	3	93.7	2		2			
DELAWARE	595(157)	139	7	94.9	137	11	91.9	1		1			
DIST. OF COLUM.	1,109(308)	280	5	97.9	280	8	97.1	8		15	1		
FLORIDA	4,138(1,178)	1,043	64	93.8	1,074	66	93.8	20	4	9			
GEORGIA	2,027(534)	584	28	95.2	462	32	88.8	6		27	4		7
HAWAII	385(101)	111	10	90.5	81	7	90.9						
IDAHO	167(48)	44	3	92.9	33	3	90.6						
ILLINOIS	13,354(3,527)	2,190	129	94.1	3,078	138	94.9	9	1	192	85	4	
INDIANA	4,099(1,082)	887	28	96.7	1,035	26	97.5	12	1	43	4		
IOWA	1,347(355)	626	25	95.9	485	33	92.8			16	3	43	
KANSAS	453(119)	129	12	90.1	142	12	91.9						
KENTUCKY	1,108(287)	277	21	92.1	311	23	92.5	5	4	15	7		1
LOUISIANA	848(222)	241	19	91.8	231	20	91.0						
MAINE	138(36)	45	3	92.9	48	3	93.1						
MARYLAND	2,524(666)	609	25	95.7	548	24	95.5	16	3	29	2		
MASSACHUSETTS	638(168)	178	9	95.0	184	10	94.6	3		5			
MICHIGAN	2,984(788)	687	31	94.8	694	42	93.9	44	7	20	2		
MINNESOTA	2,299(607)	765	26	96.6	761	29	96.2	8		23	5	46	1
MISSISSIPPI	812(214)	145	12	93.3	188	20	89.3			1		1	
MISSOURI	284(75)	182	5	94.2	77	5	92.3						1
MONTANA	21(5)	4	0	90.9	4	0	93.1						
NEBRASKA	948(223)	340	24	93.2	357	24	93.1					13	2
NEVADA	538(142)	123	9	92.6	118	9	92.3	2					
NEW HAMPSHIRE	237(62)	48	3	93.2	42	3	93.5			1			
NEW JERSEY	4,524(1,195)	1,395	103	92.5	1,418	105	92.6	6		20	2	2	6
NEW MEXICO	50(13)	20	1	94.3	11	1	88.8						
NEW YORK	8,098(2,138)	1,541	120	91.5	1,887	143	91.4	16	1	36	2	105	24
NORTH CAROLINA	2,314(611)	669	69	93.8	582	84	88.9	1		8	1		3
NORTH DAKOTA	112(29)	35	2	92.8	37	3	91.5						
OHIO	8,485(2,240)	1,887	93	94.8	2,088	108	94.9	75	7	125	11	23	4
OKLAHOMA	1,192(315)	289	22	92.1	330	34	89.8	1					
OREGON	1,529(404)	385	29	93.8	354	24	93.9						
PENNSYLVANIA	4,989(1,312)	1,093	78	92.8	1,214	108	91.2	19	2	37	5	5	
RHODE ISLAND	241(63)	64	3	93.9	80	3	93.9						
SOUTH CAROLINA	1,123(296)	398	22	94.4	270	25	91.3						1
SOUTH DAKOTA	169(44)	47	2	95.8	36	3	90.5			4			
TENNESSEE	2,337(617)	648	49	93.2	889	31	92.8			18	3		2
TEXAS	8,531(2,253)	1,918	97	94.9	1,980	113	94.2	2		28	7		
UTAH	913(241)	174	8	93.1	193	8	93.3						
VERMONT	42(11)	11	0	98.0	9	0	93.2						
VIRGINIA	1,758(464)	489	18	95.4	489	17	95.8	9		1		1	
WASHINGTON	1,391(368)	423	29	93.3	457	38	92.8			10	1		
WEST VIRGINIA	373(98)	101	5	94.8	97	5	94.4			4		2	
WISCONSIN	2,317(612)	547	39	92.7	629	39	93.8	14	1	7	1	16	3
WYOMING	11(3)	3	0	93.4	3	0	90.4						
AMERICAN SAMOA	0(-)	0	0	0.0	0	0	0.0						
GUAM	39(10)	11	1	90.2	13	1	89.1						
PUERTO RICO	619(163)	142	17	88.7	171	17	89.7						
PAC. TR. TERR.	0(1)	1	0	93.8	1	0	93.8						
VIRGIN ISLANDS	0(1)	0	0	0.0	0	0	0.0						
U.S. TOTALS	105,161(27,764)	25,722	1,529	94.1	27,013	1,784	93.5	287	32	781	154	378	58

NOTES: 1. FLOWS IN CUBIC METERS X 1000 2. APPROXIMATE MGD IN PARENTHESES 3. METRIC TONS X .9072 = SHORT TONS

FEBRUARY 10, 1977
TABLE 19

1976 NEEDS SURVEY

NUMBER AND FLOW OF EXISTING TREATMENT PLANTS WHICH WILL/WILL NOT MEET SECONDARY REQUIREMENTS
FLOW IN THOUSANDS OF CUBIC METERS/DAY

	DOES DISCHARGE MEET SECONDARY? (ITEM 25)				WILL DISCHARGE MEET SECONDARY BY JULY 1, 1977? (ITEM 26)				IS REQUIRED TREATMENT LEVEL MORE STRINGENT THAN SECONDARY? (ITEM 27)			
	NO	FLOW	YES	FLOW	NO	FLOW	YES	FLOW	NO	FLOW	YES	FLOW
ALABAMA	191	899.95	58	615.38	194	778.62	47	736.63	154	758.48	88	756.05
ALASKA	5	60.22	7	15.74	6	55.11	6	20.85	11	67.84	1	8.32
ARIZONA	58	238.72	33	397.99	62	246.69	29	382.02	85	626.44	6	2.27
ARKANSAS	216	486.77	20	86.84	214	453.08	22	119.81	180	281.63	119	296.49
CALIFORNIA	270	5,753.16	295	2,713.67	272	5,077.63	290	3,383.77	444	6,232.18	121	2,236.26
COLORADO	93	1,302.63	47	102.58	83	699.08	58	706.43	92	531.43	56	868.22
CONNECTICUT	37	816.10	64	671.30	32	679.82	69	809.58	70	1,208.18	31	281.21
DELAWARE	20	287.80	3	23.99	19	21.95	4	289.84	0	0.00	22	311.80
DIST. OF COLUM.	1	1,101.55	0	0.00	0	0.00	1	1,101.55	0	0.00	1	1,101.55
FLORIDA	100	1,008.95	164	1,173.11	125	780.26	138	1,401.81	88	1,009.89	175	1,171.91
GEORGIA	316	1,354.56	85	715.27	321	1,334.13	80	735.70	195	632.96	206	1,436.88
HAWAII	14	93.76	17	21.84	16	85.13	15	29.67	30	114.73	0	0.00
IDAHO	22	200.24	13	70.98	23	203.65	12	67.49	29	184.44	6	86.68
ILLINOIS	594	6,996.68	147	1,091.71	589	7,275.75	182	810.64	117	284.85	624	7,801.54
INDIANA	190	1,742.27	84	937.83	191	2,113.43	83	566.67	53	414.19	221	2,265.99
IOWA	622	1,149.97	93	162.65	600	923.22	105	383.72	528	498.65	182	888.67
KANSAS	328	676.98	36	172.41	386	608.80	47	238.47	346	814.81	4	28.46
KENTUCKY	140	449.44	73	406.81	138	366.61	75	489.64	72	217.24	141	639.01
LOUISIANA	179	748.95	54	288.76	167	699.75	66	339.96	283	786.24	30	169.47
MAINE	26	118.78	51	213.76	25	110.47	52	216.07	69	387.98	7	22.86
MARYLAND	54	1,128.16	69	225.45	41	361.85	83	991.96	20	92.81	104	1,260.80
MASSACHUSETTS	35	485.87	53	466.58	38	447.85	50	485.40	59	675.84	29	256.61
MICHIGAN	162	5,086.98	148	776.61	187	4,686.31	135	1,377.28	88	228.14	242	5,635.45
MINNESOTA	310	1,556.98	183	335.95	321	1,433.15	172	459.78	31	153.91	462	1,738.94
MISSISSIPPI	172	1,418.44	24	166.67	171	1,414.84	25	165.98	63	282.88	133	1,296.31
MISSOURI	381	1,837.55	122	343.45	323	1,811.84	135	321.76	489	2,086.06	6	88.35
MONTANA	62	316.62	8	38.15	85	211.68	20	151.64	117	343.28	2	21.27
NEBRASKA	188	465.15	31	132.61	185	436.25	34	138.75	225	438.61	9	148.16
NEVADA	21	98.69	23	220.76	21	285.26	23	34.10	33	218.72	11	188.65
NEW HAMPSHIRE	27	158.53	22	36.71	33	165.30	16	29.94	39	167.39	9	27.10
NEW JERSEY	136	3,275.17	86	499.22	153	2,981.55	68	811.89	83	2,266.36	134	1,491.49
NEW MEXICO	55	150.57	21	163.36	56	143.53	20	170.40	67	382.88	9	11.93
NEW YORK	384	7,739.91	221	1,959.49	388	5,250.47	223	3,544.51	299	5,838.24	217	2,924.07
NORTH CAROLINA	183	949.47	117	799.88	197	999.66	103	749.78	95	365.69	206	1,383.76
NORTH DAKOTA	76	82.06	56	52.42	64	89.48	175	45.90	245	157.62	15	3.78
OHIO	494	4,707.84	111	931.58	493	4,697.59	113	941.84	58	238.56	547	5,400.86
OKLAHOMA	327	626.24	51	271.76	328	546.36	58	357.64	28	183.74	358	744.25
OREGON	13	491.64	92	866.40	11	133.62	93	1,224.42	26	580.89	79	857.16
PENNSYLVANIA	243	3,557.37	354	3,681.94	230	3,394.94	356	3,544.51	255	2,381.03	319	4,594.69
RHODE ISLAND	9	299.46	6	52.84	8	249.91	7	102.39	11	380.18	4	52.12
SOUTH CAROLINA	297	1,178.78	53	224.66	288	867.65	52	535.71	154	634.39	196	768.96
SOUTH DAKOTA	71	163.03	10	12.46	56	142.29	31	34.16	96	53.73	20	129.97
TENNESSEE	107	1,024.78	122	777.41	110	1,114.65	111	687.54	97	645.86	132	1,156.32
TEXAS	515	2,883.87	355	1,989.87	688	3,370.35	188	1,419.88	30	88.79	834	4,696.25
UTAH	27	478.98	25	325.31	16	59.65	37	737.81	6	94.67	62	714.88
VERMONT	32	119.92	32	444.06	33	122.23	31	441.75	34	449.48	30	114.58
VIRGINIA	228	629.96	260	726.79	231	849.14	239	615.90	321	881.06	112	377.25
WASHINGTON	98	1,368.59	25	248.05	98	1,272.88	25	335.76	110	916.18	5	692.46
WEST VIRGINIA	81	304.72	37	83.96	78	276.10	48	112.04	94	238.85	26	150.54
WISCONSIN	295	1,769.98	173	454.43	307	1,531.57	161	692.76	253	523.21	215	1,701.12
WYOMING	78	114.69	6	17.33	67	71.67	12	60.60	83	133.38	0	0.00
AMERICAN SAMOA	2	1.74	0	0.00	2	1.74	0	0.00	2	1.74	0	0.00
GUAM	2	35.35	2	2.64	4	38.00	0	0.00	4	38.00	0	0.00
PUERTO RICO	26	392.43	1	2.11	25	391.71	2	2.83	22	383.61	5	10.93
PAC. TR. TERR.	3	1.89	0	0.00	2	1.32	1	0.56	3	1.89	0	0.00
VIRGIN ISLANDS	2	17.98	0	0.00	2	17.98	0	0.00	1	12.30	1	5.67
U.S. TOTALS	8,472	70,247.83	4,234	26,004.28	8,509	62,071.97	4,231	34,026.48	6,328	37,166.61	6,481	58,888.82

NOTE: FLOW IN THOUSANDS OF CUBIC METERS PER DAY/3.7854118 = MGD

FEBRUARY 10, 1977
TABLE 20

1976 NEEDS SURVEY

POPULATION, FLOW AND REMOVAL RATES OF EXISTING TREATMENT PLANTS WHICH WILL NOT/WILL MEET SECONDARY REQUIREMENTS
FLOW IN THOUSANDS OF CUBIC METERS/DAY

	FACILITIES WHICH WILL NOT MEET SECONDARY REQUIREMENTS BY JULY 1, 1977					FACILITIES WHICH WILL MEET SECONDARY REQUIREMENTS BY JULY 1, 1977			
	NUMBER	FLOW	POPULATION SERVED	GREATER THAN SECONDARY REQUIRED ? YES	NO	NUMBER	FLOW	POPULATION SERVED	REMOVAL RATE BOD & S.S.
ALABAMA	197	778.62	1,019,287	69	128	47	736.63	927,858	71.31
ALASKA	6	55.11	142,431	0	6	6	20.85	37,626	76.47
ARIZONA	62	246.69	592,908	4	58	29	382.02	1,064,460	71.81
ARKANSAS	218	477.69	884,901	111	107	22	119.81	155,164	86.95
CALIFORNIA	272	5,077.63	10,520,316	49	223	295	3,393.88	7,198,552	83.04
COLORADO	83	691.63	716,943	34	49	62	788.36	1,321,954	87.89
CONNECTICUT	32	679.82	889,985	8	24	69	889.58	1,879,020	79.99
DELAWARE	18	21.16	31,354	18	0	4	289.84	81,789	85.66
DIST. OF COLUM.	0	0.00	0	0	0	1	1,101.55	758,000	78.88
FLORIDA	126	784.61	1,585,063	77	49	137	1,481.54	2,664,053	88.41
GEORGIA	321	1,334.13	1,867,681	165	165	88	735.76	1,139,876	82.52
HAWAII	16	85.13	104,758	0	16	15	33.38	34,636	72.84
IDAHO	24	203.84	219,895	3	21	12	67.49	101,946	89.23
ILLINOIS	559	7,275.75	8,377,565	488	71	182	810.64	1,439,178	82.63
INDIANA	191	2,113.43	2,463,277	161	30	83	946.67	754,377	81.77
IOWA	609	923.45	1,558,865	144	465	185	383.72	864,468	81.64
KANSAS	300	688.48	1,223,233	4	296	69	236.65	497,646	84.64
KENTUCKY	138	366.61	725,994	89	49	75	489.64	458,295	60.25
LOUISIANA	176	646.56	1,276,258	25	151	67	343.37	1,213,998	79.68
MAINE	25	116.47	181,555	3	22	51	214.36	269,799	79.76
MARYLAND	41	361.65	401,180	33	8	85	992.84	1,367,963	88.96
MASSACHUSETTS	39	447.85	542,369	13	26	50	485.48	788,773	82.37
MICHIGAN	189	4,486.31	4,914,043	158	31	136	1,377.28	1,695,899	74.29
MINNESOTA	321	1,433.15	2,368,443	302	19	172	859.78	825,766	84.98
MISSISSIPPI	181	1,419.90	879,981	113	68	25	165.08	257,288	77.02
MISSOURI	328	1,812.98	2,750,102	1	327	141	322.32	473,158	83.86
MONTANA	87	211.78	197,062	1	86	29	151.64	260,293	79.22
NEBRASKA	185	436.25	792,874	7	178	31	140.94	278,305	76.15
NEVADA	21	285.26	500,452	6	15	23	34.18	64,178	78.51
NEW HAMPSHIRE	32	164.55	216,051	5	27	16	29.94	55,711	76.49
NEW JERSEY	149	2,945.95	4,361,606	91	58	68	811.89	1,592,263	86.25
NEW MEXICO	57	154.32	391,629	5	52	23	178.48	323,119	86.21
NEW YORK	296	5,218.41	8,026,853	188	188	222	3,546.43	4,718,442	87.84
NORTH CAROLINA	198	1,083.86	1,273,884	120	77	183	749.78	1,119,568	81.88
NORTH DAKOTA	64	89.48	204,995	0	64	175	68.98	186,077	92.22
OHIO	493	4,697.59	7,159,986	460	32	113	941.84	1,199,325	80.46
OKLAHOMA	321	561.87	1,220,949	296	24	58	357.64	773,133	88.56
OREGON	11	133.62	189,066	5	6	93	1,224.42	1,636,958	86.93
PENNSYLVANIA	243	3,487.52	5,874,611	135	107	363	3,652.56	4,878,928	85.94
RHODE ISLAND	8	249.91	243,876	1	7	7	102.39	129,272	72.46
SOUTH CAROLINA	210	868.10	974,086	84	126	52	535.71	299,698	77.12
SOUTH DAKOTA	57	185.44	278,898	14	42	31	34.18	73,438	82.86
TENNESSEE	119	1,114.91	984,773	72	47	111	687.54	1,105,892	84.93
TEXAS	684	3,388.18	6,683,868	653	30	189	1,428.93	2,984,879	87.77
UTAH	16	59.65	77,642	13	3	38	737.94	926,174	83.92
VERMONT	33	122.23	126,264	16	17	31	441.75	87,643	87.86
VIRGINIA	218	826.91	1,363,821	33	185	238	579.54	1,218,036	87.83
WASHINGTON	98	1,272.88	1,481,939	2	88	25	335.76	534,847	74.99
WEST VIRGINIA	86	284.17	474,234	14	72	49	112.23	242,415	79.99
WISCONSIN	307	1,531.57	2,133,758	158	149	161	692.76	884,879	73.86
WYOMING	70	77.53	158,232	0	70	12	68.68	122,307	68.36
AMERICAN SAMOA	2	1.74	1,488	0	2	0	0.00	0	0.00
GUAM	4	38.00	67,180	0	4	0	0.00	0	0.00
PUERTO RICO	25	391.71	994,331	5	20	2	2.83	8,760	88.88
PAC. TR. TERR.	2	1.32	2,500	0	2	1	0.56	1,500	88.00
VIRGIN ISLANDS	2	17.98	44,000	1	1	0	0.00	0	0.00
U. S. TOTALS	8,571	62,246.16	91,866,847	4,385	4,186	4,252	34,268.68	52,076,051	81.64

* REMOVAL RATE = TOTAL EFFLUENT/TOTAL INFLUENT
NOTE: FLOW IN THOUSANDS OF CUBIC METERS PER DAY/3.7854118 = MGD

FEBRUARY 10, 1977
TABLE 21

1976 NEEDS SURVEY

NUMBER OF FACILITIES AND REASONS FOR TREATMENT MORE STRINGENT THAN SECONDARY

STATE	TOTAL NUMBER OF FACILITIES	NUMBER REQUIRING MORE STRINGENT TREATMENT	REASONS FOR TREATMENT LEVEL BEING MORE STRINGENT THAN SECONDARY: EPA-APPROVED WATER QUALITY PLAN	STATE COURT ORDER	FEDERAL COURT ORDER	DISCHARGE PERMIT CONDITIONS	STATE OR FEDERAL ENFORCEMENT ORDER	VOLUNTARY COMPLIANCE	STATE CERTIFICATE	OTHER
ALABAMA	310	103	10	0	0	72	0	1	38	19
ALASKA	125	3	0	0	1	1	0	0	1	1
ARIZONA	163	9	0	0	0	1	0	0	0	0
ARKANSAS	428	235	4	0	0	143	5	0	93	10
CALIFORNIA	801	129	11	4	11	95	2	1	16	0
COLORADO	187	64	52	6	2	1	0	0	10	0
CONNECTICUT	415	31	7	1	0	11	1	0	1	1
DELAWARE	38	27	25	1	0	20	0	0	1	1
DIST. OF COLUM.	1	1	0	0	0	1	0	0	0	0
FLORIDA	326	224	14	1	3	74	6	0	9	165
GEORGIA	592	285	141	0	0	14	0	0	131	30
HAWAII	55	0	0	0	0	0	0	0	0	0
IDAHO	91	7	1	0	0	3	0	0	3	0
ILLINOIS	1,119	970	0	319	317	18	43	0	94	187
INDIANA	481	402	1	6	8	177	89	0	111	10
IOWA	1,098	283	15	0	5	151	2	0	31	30
KANSAS	426	4	0	0	1	3	0	0	1	2
KENTUCKY	328	231	97	1	0	97	0	0	16	119
LOUISIANA	355	48	2	0	0	25	0	0	32	1
MAINE	136	17	0	3	2	1	0	0	12	2
MARYLAND	292	247	240	0	0	104	0	0	0	0
MASSACHUSETTS	126	37	12	1	0	7	2	0	13	2
MICHIGAN	393	277	129	118	13	14	31	3	7	2
MINNESOTA	596	561	0	96	494	12	46	10	21	2
MISSISSIPPI	214	139	14	0	0	109	1	0	41	11
MISSOURI	770	11	0	0	1	4	0	0	2	5
MONTANA	135	9	1	0	0	0	0	0	3	5
NEBRASKA	322	9	1	0	0	0	0	0	0	0
NEVADA	67	12	2	0	0	9	0	0	1	0
NEW HAMPSHIRE	101	35	3	0	0	2	7	0	17	5
NEW JERSEY	254	155	4	82	57	7	59	1	0	1
NEW MEXICO	101	14	0	0	0	22	0	0	5	0
NEW YORK	1,013	381	9	9	14	18	32	0	8	0
NORTH CAROLINA	410	282	68	1	3	30	0	0	298	19
NORTH DAKOTA	357	15	0	0	0	15	0	0	56	139
OHIO	867	777	126	95	88	301	11	0	0	0
OKLAHOMA	448	414	326	0	0	71	0	0	162	61
OREGON	114	86	18	0	0	88	0	0	24	1
PENNSYLVANIA	1,073	524	157	76	18	334	28	0	2	0
RHODE ISLAND	22	7	2	0	0	2	0	0	64	2
SOUTH CAROLINA	386	201	20	1	26	46	3	0	3	0
SOUTH DAKOTA	144	22	8	0	1	5	0	0	124	15
TENNESSEE	348	201	22	0	4	150	0	0	0	0
TEXAS	998	959	7	0	0	3	24	0	909	9
UTAH	116	109	0	1	0	3	3	0	0	103
VERMONT	96	37	19	3	0	1	0	0	14	4
VIRGINIA	644	164	120	1	2	72	0	0	7	1
WASHINGTON	169	8	1	0	0	5	4	0	0	0
WEST VIRGINIA	542	86	63	0	0	19	1	0	9	1
WISCONSIN	689	251	5	13	8	7	29	4	159	34
WYOMING	87	0	0	0	0	0	0	0	0	0
AMERICAN SAMOA	4	0	0	0	0	0	0	0	0	0
GUAM	7	0	0	0	0	0	0	0	0	0
PUERTO RICO	34	6	0	0	0	1	1	0	0	0
PAC. TR. TERR.	39	0	0	0	0	0	0	0	0	0
VIRGIN ISLANDS	4	1	0	0	0	0	0	0	0	1
U.S. TOTALS	19,841	9,836	1,765	737	931	2,367	428	41	2,613	1,985

PROJECTED CHANGE IN TREATMENT PROCESS USE
NUMBERS OF FACILITIES AND ASSOCIATED FLOW
FLOW IN THOUSANDS OF CUBIC METERS PER DAY
UNITED STATES TOTAL

PRELIMINARY TREATMENT

	NOW IN USE			UNDER CONSTRUCTION			REQUIRED BUT NOT YET FUNDED		
	NUMBER	FLOW		NUMBER	FLOW		NUMBER	FLOW	
ENLARGE	1,030	15,334	(4,858)	20	1,304	(344)	2	12	(3)
UPGRADE	248	3,582	(946)	2	1,514	(399)	9	4	(1)
ENLARGE AND UPGRADE	339	3,586	(926)	5	107	(28)	3	5	(1)
INSTALL IN NEW PLANT	10	99	(26)	196	1,784	(466)	2,936	9,729	(2,578)
REPLACE	138	2,286	(604)	0	0	(0)	7	44	(12)
ABANDON	663	2,858	(755)	0	0	(0)	1	1	(0)
NO CHANGE	2,055	20,782	(5,490)	33	241	(63)	7	42	(11)
OTHER	11	343	(90)	1	30	(7)	10	30	(7)
TOTALS	4,494	48,790	12,887	257	4,968	1,307	2,975	9,869	2,605

PUMPING

	NOW IN USE			UNDER CONSTRUCTION			REQUIRED BUT NOT YET FUNDED		
	NUMBER	FLOW		NUMBER	FLOW		NUMBER	FLOW	
ENLARGE	516	8,497	(2,244)	7	247	(65)	0	0	(0)
UPGRADE	85	1,426	(376)	2	181	(47)	3	5	(1)
ENLARGE AND UPGRADE	163	2,669	(702)	2	2	(0)	0	0	(0)
INSTALL IN NEW PLANT	13	488	(105)	110	895	(236)	1,473	7,420	(1,968)
REPLACE	68	1,837	(485)	1	2	(0)	1	13	(3)
ABANDON	360	1,258	(332)	1	1	(0)	0	0	(0)
NO CHANGE	988	10,421	(2,752)	8	117	(31)	0	0	(0)
OTHER	12	351	(92)	1	30	(7)	2	14	(3)
TOTALS	2,205	26,650	7,088	132	1,475	386	1,479	7,452	1,967

PRIMARY SEDIMENTATION

	NOW IN USE			UNDER CONSTRUCTION			REQUIRED BUT NOT YET FUNDED		
	NUMBER	FLOW		NUMBER	FLOW		NUMBER	FLOW	
ENLARGE	816	10,967	(2,897)	9	1,188	(311)	7	112	(29)
UPGRADE	340	5,295	(1,398)	4	119	(31)	9	140	(37)
ENLARGE AND UPGRADE	487	4,459	(1,178)	9	923	(243)	6	103	(27)
INSTALL IN NEW PLANT	12	84	(22)	125	1,548	(414)	1,017	7,441	(1,965)
REPLACE	149	905	(239)	6	79	(20)	0	0	(0)
ABANDON	761	2,888	(763)	0	0	(0)	2	15	(3)
NO CHANGE	1,525	18,046	(4,767)	26	246	(64)	6	2	(0)
OTHER	11	158	(41)	3	25	(6)	18	82	(21)
TOTALS	4,101	42,804	11,305	184	4,148	1,089	1,865	7,895	2,082

PROJECTED CHANGE IN TREATMENT PROCESS USE
NUMBERS OF FACILITIES AND ASSOCIATED FLOW
FLOW IN THOUSANDS OF CUBIC METERS PER DAY
UNITED STATES TOTAL

TRICKLING FILTER

	NOW IN USE			UNDER CONSTRUCTION			REQUIRED BUT NOT YET FUNDED		
	NUMBER	FLOW		NUMBER	FLOW		NUMBER	FLOW	
ENLARGE	331	3,437	(988)	2	266	(70)	7	76	(20)
UPGRADE	336	1,569	(414)	1	227	(59)	8	314	(83)
ENLARGE AND UPGRADE	331	1,746	(461)	2	96	(25)	2	30	(7)
INSTALL IN NEW PLANT	0	0	(0)	25	267	(70)	125	717	(189)
REPLACE	144	373	(98)	0	0	(0)	0	0	(0)
ABANDON	513	2,750	(726)	0	0	(0)	2	26	(7)
NO CHANGE	579	3,918	(1,032)	11	86	(23)	4	28	(7)
OTHER	6	86	(22)	1	2	(0)	60	524	(138)
TOTALS	2,248	13,871	3,661	42	948	247	208	1,715	451

ACTIVATED SLUDGE

	NOW IN USE			UNDER CONSTRUCTION			REQUIRED BUT NOT YET FUNDED		
	NUMBER	FLOW		NUMBER	FLOW		NUMBER	FLOW	
ENLARGE	917	10,041	(2,652)	30	1,353	(357)	9	122	(32)
UPGRADE	383	4,116	(1,087)	23	1,879	(496)	106	1,926	(508)
ENLARGE AND UPGRADE	571	8,618	(2,276)	19	1,291	(341)	35	1,168	(306)
INSTALL IN NEW PLANT	10	856	(226)	340	5,192	(1,371)	5,391	38,205	(7,979)
REPLACE	82	1,188	(314)	5	53	(14)	5	81	(21)
ABANDON	484	1,478	(390)	1	4	(1)	19	68	(18)
NO CHANGE	1,680	24,294	(6,417)	192	1,725	(455)	30	717	(189)
OTHER	17	592	(156)	40	1,806	(477)	271	3,521	(930)
TOTALS	4,834	51,183	13,518	560	13,305	3,512	5,866	37,772	9,975

FILTRATION

	NOW IN USE			UNDER CONSTRUCTION			REQUIRED BUT NOT YET FUNDED		
	NUMBER	FLOW		NUMBER	FLOW		NUMBER	FLOW	
ENLARGE	183	653	(172)	9	352	(93)	22	35	(9)
UPGRADE	45	166	(43)	12	1,036	(273)	150	1,397	(369)
ENLARGE AND UPGRADE	62	247	(65)	9	818	(216)	47	539	(142)
INSTALL IN NEW PLANT	9	417	(110)	98	3,982	(1,052)	3,869	29,877	(5,515)
REPLACE	8	137	(36)	0	0	(0)	1	3	(0)
ABANDON	128	537	(142)	1	1	(0)	22	29	(5)
NO CHANGE	392	1,367	(361)	78	637	(168)	27	2,439	(644)
OTHER	6	21	(5)	17	263	(69)	444	12,997	(3,433)
TOTALS	683	3,545	934	208	7,089	1,871	4,273	38,387	10,117

1976 NEEDS SURVEY

FEBRUARY 18, 1977
TABLE 22

PROJECTED CHANGE IN TREATMENT PROCESS USE
NUMBERS OF FACILITIES AND ASSOCIATED FLOW
FLOW IN THOUSANDS OF CUBIC METERS PER DAY
UNITED STATES TOTAL

ACTIVATED CARBON

	NOW IN USE			UNDER CONSTRUCTION			REQUIRED BUT NOT YET FUNDED		
	NUMBER	FLOW		NUMBER	FLOW		NUMBER	FLOW	
ENLARGE	2	1	(0)	1	136	(35)	0	0	(0)
UPGRADE	0	0	(0)	2	183	(48)	5	137	(36)
ENLARGE AND UPGRADE	0	0	(0)	2	45	(11)	3	246	(65)
INSTALL IN NEW PLANT	2	10	(2)	6	438	(115)	259	1,914	(505)
REPLACE	0	0	(0)	0	0	(0)	0	0	(0)
ABANDON	2	9	(2)	0	0	(0)	0	0	(0)
NO CHANGE	8	88	(23)	2	16	(4)	0	0	(0)
OTHER	1	39	(10)	0	0	(0)	11	145	(38)
TOTALS	15	147	37	13	820	213	269	2,442	644

TWO STAGE TERTIARY LIME

	NOW IN USE			UNDER CONSTRUCTION			REQUIRED BUT NOT YET FUNDED		
	NUMBER	FLOW		NUMBER	FLOW		NUMBER	FLOW	
ENLARGE	1	0	(0)	0	0	(0)	2	16	(4)
UPGRADE	3	496	(130)	1	90	(23)	4	3	(0)
ENLARGE AND UPGRADE	9	52	(13)	0	0	(0)	2	0	(0)
INSTALL IN NEW PLANT	0	0	(0)	2	272	(71)	28	571	(150)
REPLACE	0	0	(0)	0	0	(0)	0	0	(0)
ABANDON	1	1	(0)	0	0	(0)	0	0	(0)
NO CHANGE	2	19	(5)	0	0	(0)	0	0	(0)
OTHER	0	0	(0)	4	27	(7)	12	66	(17)
TOTALS	16	565	148	7	389	101	48	656	171

BIOLOGICAL NITRIFICATION

	NOW IN USE			UNDER CONSTRUCTION			REQUIRED BUT NOT YET FUNDED		
	NUMBER	FLOW		NUMBER	FLOW		NUMBER	FLOW	
ENLARGE	5	197	(52)	2	172	(45)	1	2	(0)
UPGRADE	2	41	(10)	1	4	(1)	59	1,010	(266)
ENLARGE AND UPGRADE	10	50	(13)	2	242	(63)	5	119	(31)
INSTALL IN NEW PLANT	0	0	(0)	30	2,475	(654)	474	9,828	(2,596)
REPLACE	0	0	(0)	0	0	(0)	0	0	(0)
ABANDON	0	0	(0)	0	0	(0)	0	0	(0)
NO CHANGE	14	368	(97)	1	0	(0)	0	0	(0)
OTHER	1	35	(9)	1	3	(0)	1	9	(0)
TOTALS	32	891	181	37	2,896	763	544	11,686	3,064

PROJECTED CHANGE IN TREATMENT PROCESS USE
NUMBERS OF FACILITIES AND ASSOCIATED FLOW
FLOW IN THOUSANDS OF CUBIC METERS PER DAY
UNITED STATES TOTAL

BIOLOGICAL DENITRIFICATION

	NOW IN USE			UNDER CONSTRUCTION			REQUIRED BUT NOT YET FUNDED		
	NUMBER	FLOW		NUMBER	FLOW		NUMBER	FLOW	
ENLARGE	2	179	(47)	1	113	(29)	0	0	(0)
UPGRADE	0	0	(0)	0	0	(0)	37	365	(96)
ENLARGE AND UPGRADE	0	0	(0)	1	15	(3)	1	21	(5)
INSTALL IN NEW PLANT	1	3	(0)	4	141	(37)	88	2,591	(684)
REPLACE	0	0	(0)	0	0	(0)	0	0	(0)
ABANDON	0	0	(0)	0	0	(0)	0	0	(0)
NO CHANGE	7	125	(33)	1	0	(0)	0	0	(0)
OTHER	1	39	(10)	0	0	(0)	2	4	(1)
TOTALS	11	346	90	7	269	69	128	2,981	786

ION EXCHANGE

	NOW IN USE			UNDER CONSTRUCTION			REQUIRED BUT NOT YET FUNDED		
	NUMBER	FLOW		NUMBER	FLOW		NUMBER	FLOW	
UPGRADE	0	0	(0)	0	0	(0)	0	0	(0)
ENLARGE AND UPGRADE	0	0	(0)	0	0	(0)	0	0	(0)
INSTALL IN NEW PLANT	0	0	(0)	3	264	(69)	0	0	(0)
REPLACE	0	0	(0)	0	0	(0)	0	0	(0)
ABANDON	0	0	(0)	0	0	(0)	0	0	(0)
NO CHANGE	0	0	(0)	0	0	(0)	0	0	(0)
OTHER	0	0	(0)	0	0	(0)	3	3	(0)
TOTALS	0	0	0	3	264	69	3	3	0

BREAKPOINT CHLORINATION

	NOW IN USE			UNDER CONSTRUCTION			REQUIRED BUT NOT YET FUNDED		
	NUMBER	FLOW		NUMBER	FLOW		NUMBER	FLOW	
ENLARGE	2	5	(1)	0	0	(0)	0	0	(0)
UPGRADE	9	27	(7)	1	2	(0)	10	16	(4)
ENLARGE AND UPGRADE	4	39	(10)	0	0	(0)	2	54	(14)
INSTALL IN NEW PLANT	0	0	(0)	2	0	(0)	47	359	(94)
REPLACE	0	0	(0)	0	0	(0)	0	0	(0)
ABANDON	5	13	(3)	0	0	(0)	0	0	(0)
NO CHANGE	10	81	(21)	0	0	(0)	0	0	(0)
OTHER	0	0	(0)	0	0	(0)	23	47	(12)
TOTALS	30	165	42	3	2	0	82	476	124

PROJECTED CHANGE IN TREATMENT PROCESS USE
NUMBERS OF FACILITIES AND ASSOCIATED FLOW
FLOW IN THOUSANDS OF CUBIC METERS PER DAY
UNITED STATES TOTAL

AMMONIA STRIPPING

	NOW IN USE			UNDER CONSTRUCTION			REQUIRED BUT NOT YET FUNDED		
	NUMBER	FLOW		NUMBER	FLOW		NUMBER	FLOW	
ENLARGE	3	96	(25)	1	2	(0)	0	0	(0)
UPGRADE	14	22	(5)	0	0	(0)	41	46	(12)
ENLARGE AND UPGRADE	4	35	(9)	2	1	(0)	9	36	(9)
INSTALL IN NEW PLANT	0	0	(0)	16	118	(31)	209	1,084	(278)
REPLACE	0	0	(0)	0	0	(0)	0	0	(0)
ABANDON	1	2	(0)	0	0	(0)	0	0	(0)
NO CHANGE	17	63	(16)	0	0	(0)	0	0	(0)
OTHER	0	0	(0)	1	0	(0)	20	76	(20)
TOTALS	41	218	55	26	121	31	279	1,212	319

DISINFECTION

	NOW IN USE			UNDER CONSTRUCTION			REQUIRED BUT NOT YET FUNDED		
	NUMBER	FLOW		NUMBER	FLOW		NUMBER	FLOW	
ENLARGE	1,935	16,020	(4,232)	21	779	(205)	15	109	(28)
UPGRADE	287	1,554	(410)	26	1,424	(376)	76	1,730	(457)
ENLARGE AND UPGRADE	358	4,604	(1,216)	15	869	(229)	41	463	(122)
INSTALL IN NEW PLANT	22	542	(143)	294	3,473	(917)	4,767	28,036	(5,293)
REPLACE	129	2,227	(588)	4	26	(7)	8	89	(23)
ABANDON	645	2,796	(738)	3	11	(3)	9	13	(3)
NO CHANGE	2,138	21,784	(5,755)	85	1,302	(344)	20	428	(113)
OTHER	13	393	(104)	14	798	(210)	328	5,931	(1,566)
TOTALS	4,547	49,924	13,186	485	8,684	2,291	5,264	28,799	7,605

LAND TREATMENT OF EFFLUENT

	NOW IN USE			UNDER CONSTRUCTION			REQUIRED BUT NOT YET FUNDED		
	NUMBER	FLOW		NUMBER	FLOW		NUMBER	FLOW	
ENLARGE	6	34	(9)	0	0	(0)	0	0	(0)
UPGRADE	1	2	(0)	0	0	(0)	3	34	(9)
ENLARGE AND UPGRADE	10	9	(2)	1	227	(59)	0	0	(0)
INSTALL IN NEW PLANT	0	0	(0)	6	30	(7)	198	869	(229)
REPLACE	2	398	(103)	0	0	(0)	0	0	(0)
ABANDON	7	2	(0)	0	0	(0)	0	0	(0)
NO CHANGE	32	53	(14)	3	0	(0)	0	0	(0)
OTHER	0	0	(0)	0	0	(0)	3	4	(1)
TOTALS	58	498	128	10	257	66	204	907	239

PROJECTED CHANGE IN TREATMENT PROCESS USE
NUMBERS OF FACILITIES AND ASSOCIATED FLOW
FLOW IN THOUSANDS OF CUBIC METERS PER DAY
UNITED STATES TOTAL

OXIDATION PONDS

	NOW IN USE			UNDER CONSTRUCTION			REQUIRED BUT NOT YET FUNDED		
	NUMBER	FLOW		NUMBER	FLOW		NUMBER	FLOW	
ENLARGE	597	1,513	(399)	8	383	(80)	3	1	(0)
UPGRADE	609	458	(121)	22	49	(13)	49	193	(58)
ENLARGE AND UPGRADE	555	1,328	(351)	2	10	(2)	21	74	(19)
INSTALL IN NEW PLANT	9	7	(1)	140	160	(42)	2,228	2,383	(629)
REPLACE	149	1,191	(314)	0	0	(0)	7	37	(9)
ABANDON	1,291	2,260	(591)	2	30	(8)	2	0	(0)
NO CHANGE	1,553	2,604	(688)	38	389	(102)	22	33	(8)
OTHER	32	9	(2)	4	60	(15)	197	705	(186)
TOTALS	4,795	9,359	2,467	216	1,081	262	2,529	3,426	901

OTHER TREATMENT

	NOW IN USE			UNDER CONSTRUCTION			REQUIRED BUT NOT YET FUNDED		
	NUMBER	FLOW		NUMBER	FLOW		NUMBER	FLOW	
ENLARGE	337	3,730	(985)	16	530	(140)	2	19	(5)
UPGRADE	184	877	(231)	18	1,260	(332)	122	1,104	(291)
ENLARGE AND UPGRADE	477	3,937	(1,040)	7	988	(261)	60	536	(141)
INSTALL IN NEW PLANT	14	73	(19)	154	3,432	(906)	3,421	23,174	(6,121)
REPLACE	98	1,384	(365)	0	0	(0)	7	18	(5)
ABANDON	492	1,638	(432)	3	1	(0)	9	22	(5)
NO CHANGE	771	9,350	(2,470)	48	370	(97)	34	184	(48)
OTHER	18	26	(7)	22	648	(171)	355	12,434	(3,284)
TOTALS	2,375	21,017	5,549	264	7,229	1,907	4,010	37,491	9,899

1976 NEEDS SURVEY

FEBRUARY 10, 1977
TABLE 23

PROJECTED CHANGE IN SLUDGE UNIT PROCESS USE
NUMBERS OF FACILITIES AND ASSOCIATED VOLUME
(IN METRIC TONS PER DAY)
UNITED STATES TOTAL

ANAEROBIC DIGESTION

	NOW IN USE		UNDER CONSTRUCTION		REQUIRED BUT NOT YET FUNDED	
	NUMBER	VOLUME	NUMBER	VOLUME	NUMBER	VOLUME
ENLARGE	1,149	2,339	20	201	6	52
UPGRADE	567	751	20	215	42	67
ENLARGE AND UPGRADE	871	1,955	16	473	19	26
INSTALL IN NEW PLANT	9	19	104	912	3,896	2,772
REPLACE	143	169	7	47	4	12
ABANDON	1,117	810	1	0	2	0
NO CHANGE	2,833	4,198	48	147	21	17
OTHER	35	76	21	289	189	252
TOTALS	5,928	9,917	297	2,284	3,379	3,198

HEAT TREATMENT

	NOW IN USE		UNDER CONSTRUCTION		REQUIRED BUT NOT YET FUNDED	
	NUMBER	VOLUME	NUMBER	VOLUME	NUMBER	VOLUME
ENLARGE	46	139	1	23	0	0
UPGRADE	11	52	3	46	11	165
ENLARGE AND UPGRADE	24	154	2	71	4	36
INSTALL IN NEW PLANT	0	0	24	298	75	646
REPLACE	0	0	3	12	0	0
ABANDON	39	49	0	0	1	0
NO CHANGE	80	614	8	226	3	24
OTHER	4	9	9	386	31	572
TOTALS	204	1,001	50	1,062	125	1,443

AIR DRYING

	NOW IN USE		UNDER CONSTRUCTION		REQUIRED BUT NOT YET FUNDED	
	NUMBER	VOLUME	NUMBER	VOLUME	NUMBER	VOLUME
ENLARGE	1,485	1,913	20	144	5	19
UPGRADE	439	311	12	38	26	13
ENLARGE AND UPGRADE	701	782	9	64	22	25
INSTALL IN NEW PLANT	26	5	175	326	3,863	2,451
REPLACE	142	81	5	3	7	4
ABANDON	911	684	2	0	2	0
NO CHANGE	2,453	2,944	52	36	27	19
OTHER	26	25	13	36	160	187
TOTALS	6,183	6,745	288	787	3,912	2,718

PROJECTED CHANGE IN SLUDGE UNIT PROCESS USE
NUMBERS OF FACILITIES AND ASSOCIATED VOLUME
(IN METRIC TONS PER DAY)
UNITED STATES TOTAL

DEWATERING

	NOW IN USE		UNDER CONSTRUCTION		REQUIRED BUT NOT YET FUNDED	
	NUMBER	VOLUME	NUMBER	VOLUME	NUMBER	VOLUME
ENLARGE	327	1,497	7	161	7	12
UPGRADE	69	280	18	166	66	492
ENLARGE AND UPGRADE	145	1,471	7	211	15	129
INSTALL IN NEW PLANT	4	131	148	976	1,476	4,039
REPLACE	18	63	1	8	2	14
ABANDON	140	280	0	0	6	1
NO CHANGE	573	2,971	91	1,852	6	92
OTHER	11	72	17	267	127	1,115
TOTALS	1,307	6,685	241	3,641	1,707	5,894

INCINERATION

	NOW IN USE		UNDER CONSTRUCTION		REQUIRED BUT NOT YET FUNDED	
	NUMBER	VOLUME	NUMBER	VOLUME	NUMBER	VOLUME
ENLARGE	308	1,831	6	97	3	2
UPGRADE	132	354	10	157	47	1,346
ENLARGE AND UPGRADE	322	1,242	7	562	10	124
INSTALL IN NEW PLANT	4	15	89	1,653	801	2,481
REPLACE	51	366	0	0	1	3
ABANDON	252	149	0	0	0	0
NO CHANGE	498	2,247	18	1,551	5	71
OTHER	9	15	5	153	46	937
TOTALS	1,568	6,219	185	4,173	913	4,964

RECALCINATION

	NOW IN USE		UNDER CONSTRUCTION		REQUIRED BUT NOT YET FUNDED	
	NUMBER	VOLUME	NUMBER	VOLUME	NUMBER	VOLUME
ENLARGE	44	382	5	81	3	24
UPGRADE	18	43	11	113	32	218
ENLARGE AND UPGRADE	22	297	5	239	6	42
INSTALL IN NEW PLANT	0	0	14	174	118	480
REPLACE	5	127	0	0	0	0
ABANDON	46	42	1	0	1	0
NO CHANGE	83	1,489	16	313	2	18
OTHER	6	3	15	91	39	406
TOTALS	224	2,213	67	1,002	201	1,188

PROJECTED CHANGE IN SLUDGE UNIT PROCESS USE
NUMBERS OF FACILITIES AND ASSOCIATED VOLUME
(IN METRIC TONS PER DAY)
UNITED STATES TOTAL

LAND FILL

	NOW IN USE		UNDER CONSTRUCTION		REQUIRED BUT NOT YET FUNDED	
	NUMBER	VOLUME	NUMBER	VOLUME	NUMBER	VOLUME
ENLARGE	234	826	3	41	2	25
UPGRADE	36	76	3	41	11	108
ENLARGE AND UPGRADE	63	377	0	0	1	8
INSTALL IN NEW PLANT	3	0	106	343	1,765	1,607
REPLACE	15	9	1	8	0	0
ABANDON	295	282	1	0	0	0
NO CHANGE	1,369	1,792	14	46	0	0
OTHER	4	37	0	0	5	12
TOTALS	2,019	3,319	128	479	1,784	1,752

LAND SPREADING OF SLUDGE

	NOW IN USE		UNDER CONSTRUCTION		REQUIRED BUT NOT YET FUNDED	
	NUMBER	VOLUME	NUMBER	VOLUME	NUMBER	VOLUME
ENLARGE	93	317	1	61	0	0
UPGRADE	25	11	0	0	1	0
ENLARGE AND UPGRADE	74	61	0	0	0	1
INSTALL IN NEW PLANT	4	0	28	57	294	1,033
REPLACE	4	1	0	0	6	14
ABANDON	80	81	0	0	0	0
NO CHANGE	383	366	4	1	0	0
OTHER	1	0	3	16	21	58
TOTALS	664	837	36	135	328	1,098

OCEAN DUMPING

	NOW IN USE		UNDER CONSTRUCTION		REQUIRED BUT NOT YET FUNDED	
	NUMBER	VOLUME	NUMBER	VOLUME	NUMBER	VOLUME
ENLARGE	2	0	0	0	0	0
UPGRADE	0	0	0	0	0	0
ENLARGE AND UPGRADE	1	0	0	0	0	0
INSTALL IN NEW PLANT	0	0	0	0	0	0
REPLACE	2	127	0	0	0	0
ABANDON	31	678	0	0	0	0
NO CHANGE	4	4	0	0	0	0
OTHER	0	0	0	0	0	0
TOTALS	40	809	0	0	0	0

1976 NEEDS SURVEY

FEBRUARY 10, 1977
TABLE 23

PROJECTED CHANGE IN SLUDGE UNIT PROCESS USE
NUMBERS OF FACILITIES AND ASSOCIATED VOLUME
(IN METRIC TONS PER DAY)
UNITED STATES TOTAL

OTHER SLUDGE HANDLING

	NOW IN USE		UNDER CONSTRUCTION		REQUIRED BUT NOT YET FUNDED	
	NUMBER	VOLUME	NUMBER	VOLUME	NUMBER	VOLUME
ENLARGE	875	1,988	22	284	5	37
UPGRADE	431	775	28	380	55	162
ENLARGE AND UPGRADE	880	2,239	15	344	27	91
INSTALL IN NEW PLANT	32	130	249	1,612	3,729	4,944
REPLACE	152	231	4	12	4	7
ABANDON	1,106	980	5	1	6	8
NO CHANGE	2,575	3,240	46	185	23	14
OTHER	48	84	31	432	169	752
TOTALS	6,091	9,187	498	2,869	4,009	6,007

1976 NEEDS SURVEY

FEBRUARY 18, 1977
TABLE 24

PRESENT AND PROJECTED DAILY SLUDGE VOLUMES
BY SLUDGE PROCESS
IN METRIC TONS PER DAY
UNITED STATES TOTAL

PROCESS	PRESENT	PROJECTED	% CHANGE
ANAEROBIC DIGESTION	9,888	5,277	- 45
HEAT TREATMENT	1,092	2,663	+ 144
AIR DRYING	6,686	3,604	- 48
DEWATERING	6,688	9,384	+ 40
INCINERATION	6,219	9,115	+ 47
RECALCINATION	2,289	2,181	+ 0
LAND FILL	3,395	2,286	- 32
LAND SPREADING OF SLUDGE	848	1,237	+ 48
OCEAN DUMPING	783	0	- 99
OTHER SLUDGE HANDLING	9,176	8,729	- 5

1976 NEEDS SURVEY

FEBRUARY 18, 1977
TABLE 29

TREATMENT PROCESS AND SLUDGE HANDLING SUMMARY
NUMBERS OF FACILITIES AND ASSOCIATED FLOW
(FLOW IN THOUSANDS OF CUBIC METERS PER DAY)
UNITED STATES TOTAL

	NOW IN USE		UNDER CONSTRUCTION		REQUIRED BUT NOT YET FUNDED	
	NUMBER	FLOW	NUMBER	FLOW	NUMBER	FLOW
TREATMENT PROCESSES						
PRELIMINARY TREATMENT	4,495	48,798	257	4,961	2,975	9,876
PUMPING	2,206	26,861	132	1,479	1,479	7,455
PRIMARY SEDIMENTATION	4,102	42,732	185	4,142	1,866	7,988
TRICKLING FILTER	2,262	13,875	42	958	289	1,718
ACTIVATED SLUDGE	4,833	51,198	563	13,309	5,867	37,783
FILTRATION	643	3,514	208	7,892	4,275	38,314
ACTIVATED CARBON	12	188	13	822	269	2,443
TWO STAGE TERTIARY LIME	16	567	7	398	48	698
BIOLOGICAL NITRIFICATION	32	693	37	2,898	585	11,688
BIOLOGICAL DENITRIFICATION	9	385	7	278	120	2,984
ION EXCHANGE	1	0	3	264	3	3
BREAKPOINT CHLORINATION	30	166	3	3	82	477
AMMONIA STRIPPING	41	228	20	122	279	1,214
DISINFECTION	4,548	49,933	465	8,687	5,265	28,889
LAND TREATMENT OF EFFLUENT	56	492	10	257	284	988
OXIDATION PONDS	4,799	9,353	214	1,885	2,538	3,427
OTHER TREATMENT	2,374	21,822	265	7,232	4,819	37,498
SLUDGE HANDLING METHODS						
ANAEROBIC DIGESTION	5,908	68,988	294	6,257	3,351	14,469
HEAT TREATMENT	206	5,478	58	3,688	122	7,871
AIR DRYING	6,183	39,765	286	2,554	3,724	12,301
DEWATERING	1,389	37,628	241	7,329	1,781	25,816
INCINERATION	1,574	37,311	105	8,384	913	24,342
RECALCINATION	225	12,242	67	3,117	201	5,185
LAND FILL	2,822	19,622	125	1,671	1,781	7,856
LAND SPREADING OF SLUDGE	667	4,827	36	341	329	4,883
OCEAN DUMPING	40	7,692	0	0	0	0
OTHER SLUDGE HANDLING	6,115	55,810	399	9,228	3,959	27,846

1976 NEEDS SURVEY

SURVEY SAMPLE CHARACTERISTICS
CATEGORIES I THRU IV

	TOTAL FACILITIES	NUMBER OF NON-SAMPLE FACILITIES	NUMBER OF SAMPLE FACILITIES	SAMPLE PERCENT
ALABAMA	415	213	69	34.0
ALASKA	126	126	0	100.0
ARIZONA	188	188	0	100.0
ARKANSAS	437	66	81	100.0
CALIFORNIA	1,050	1,050	0	21.0
COLORADO	221	221	0	100.0
CONNECTICUT	158	158	0	100.0
DELAWARE	45	45	0	100.0
DIST. OF COLUM.	1	1	0	100.0
FLORIDA	503	248	87	34.0
GEORGIA	810	264	142	26.0
HAWAII	55	55	0	100.0
IDAHO	205	205	0	100.0
ILLINOIS	1,491	751	148	20.0
INDIANA	537	332	41	26.0
IOWA	1,120	160	192	20.0
KANSAS	434	128	66	21.0
KENTUCKY	372	92	86	20.0
LOUISIANA	374	184	38	20.0
MAINE	237	237	0	100.0
MARYLAND	352	352	0	100.0
MASSACHUSETTS	251	251	0	100.0
MICHIGAN	783	533	58	20.0
MINNESOTA	767	312	91	20.0
MISSISSIPPI	227	47	36	20.0
MISSOURI	826	241	117	20.0
MONTANA	165	16	48	37.0
NEBRASKA	329	47	96	34.0
NEVADA	85	85	0	100.0
NEW HAMPSHIRE	160	160	0	100.0
NEW JERSEY	554	544	2	20.0
NEW MEXICO	113	23	28	22.2
NEW YORK	2,145	2,145	0	100.0
NORTH CAROLINA	561	152	86	21.0
NORTH DAKOTA	357	27	66	20.0
OHIO	991	628	189	30.0
OKLAHOMA	456	159	60	28.2
OREGON	152	81	15	21.0
PENNSYLVANIA	1,891	1,233	283	43.0
RHODE ISLAND	34	34	0	100.0
SOUTH CAROLINA	455	455	0	100.0
SOUTH DAKOTA	147	49	55	63.0
TENNESSEE	381	381	0	100.0
TEXAS	1,132	781	94	21.0
UTAH	156	156	0	100.0
VERMONT	116	116	0	100.0
VIRGINIA	785	785	0	100.0
WASHINGTON	257	257	0	100.0
WEST VIRGINIA	611	611	0	100.0
WISCONSIN	987	987	0	100.0
WYOMING	97	7	28	100.0
AMERICAN SAMOA	6	6	0	31.0
GUAM	7	7	0	100.0
PUERTO RICO	34	34	0	100.0
PAC. TR. TERR.	39	39	0	100.0
VIRGIN ISLANDS	4	4	0	100.0

III. FIGURES

A. List of Figures

FIGURE 1 Cost vs. Pipe Volume for Collector Sewers

FIGURE 2 Cost vs. Pipe Volume for Interceptor Sewers

FIGURE 3 Cost vs. Pipe Volume for Force Mains used in Collector Sewer Systems

FIGURE 4 Cost vs. Pipe Volume for Force Mains used in Interceptor Sewer Systems

FIGURE 5 Cost vs. Capacity for Pumping Stations used in Collector Sewer Systems

FIGURE 6 Cost vs. Capacity for Pumping Stations used in Interceptor Sewer Systems

FIGURE 7 Cost vs. Length of Gravity Sewers of Various Diameters

FIGURE 8 Cost vs. Length of Force Mains

B. Explanation of Figures

FIGURE 1 Cost vs. Pipe Volume for Collector Sewers

FIGURE 2 Cost vs. Pipe Volume for Interceptor Sewers

FIGURE 3 Cost vs. Pipe Volume for Force Mains used in Collector Sewer Systems

FIGURE 4 Cost vs. Pipe Volume for Force Mains used in Interceptor Sewer Systems

FIGURE 5 Cost vs. Capacity for Pumping Stations used in Collector Sewer Systems

FIGURE 6 Cost vs. Capacity for pumping Stations used in Interceptor Sewer Systems

Regression analyses of pipe and pumping station data were made and the results are presented in Figures 1 thru 6.

Figures 1 thru 4 show the observed relationships between the cost and the volume of pipe based on firm estimates and comparable construction cost data obtained in the field during the Needs Survey (Basis of Estimate codes 4 and 5). Pipe volumes are determined as Pi X (radius) squared X length. Plots are made for costs versus volume for collector sewers and interceptor sewer systems in Figures 1 thru 4, respectively. The cost of pipe is presented as ordinate in logarithmic scale and the volume of pipe is shown as abscissa in logarithmic scale.

It will be apparent to the experienced reader that while cost curves for pipe are usually shown as cost vs. pipe diameter, we noted that the correlation coefficients for regression analyses of pipe data were significantly higher when volume was plotted against cost as opposed to diameter against cost. The implications of these findings are that the costs of large diameter pipe usually associated with urban construction constraints are significantly higher than small diameter pipe more commonly found in less densely populated areas. For example, the cost of 60 inch diameter pipe is shown to be almost 100 times as expensive per linear foot as 6 inch pipe, even though the diameter difference is only ten times.

Figures 5 and 6 show cost versus rated capacity for pumping stations in collector and interceptor sewer systems, respectively. The rated capacity is shown as abscissa in logarithmic scale and the cost of pumping stations is presented as ordinate in logarithmic scale.

All correlation coefficients for these analyses are above 0.7. This indicates that the data for conveying systems collected in the 1976 Needs Survey reflect a definite correlation between the cost of pipe and volume of pipe, and the cost of pumping stations and rated pumping capacity of pumping stations. Each figure contains the appropriate correlation coefficient and equation.

FIGURE 7 Cost vs. Length of Gravity Sewers of Various Diameters

FIGURE 8 Cost vs. Length of Force Mains

Both Figures 7 and 8 were plotted using data which was reported under basis of estimate codes 4 (engineer/consultant firm estimate) and 5 (cost of previous comparable construction). Some 3628 data points were used to plot the curves in Figure 7 and 699 data points were used to plot the curves in Figure 8.

These figures represent National cost averages only. EPA is in the process of utilizing the available data to develop a set of local cost factors.

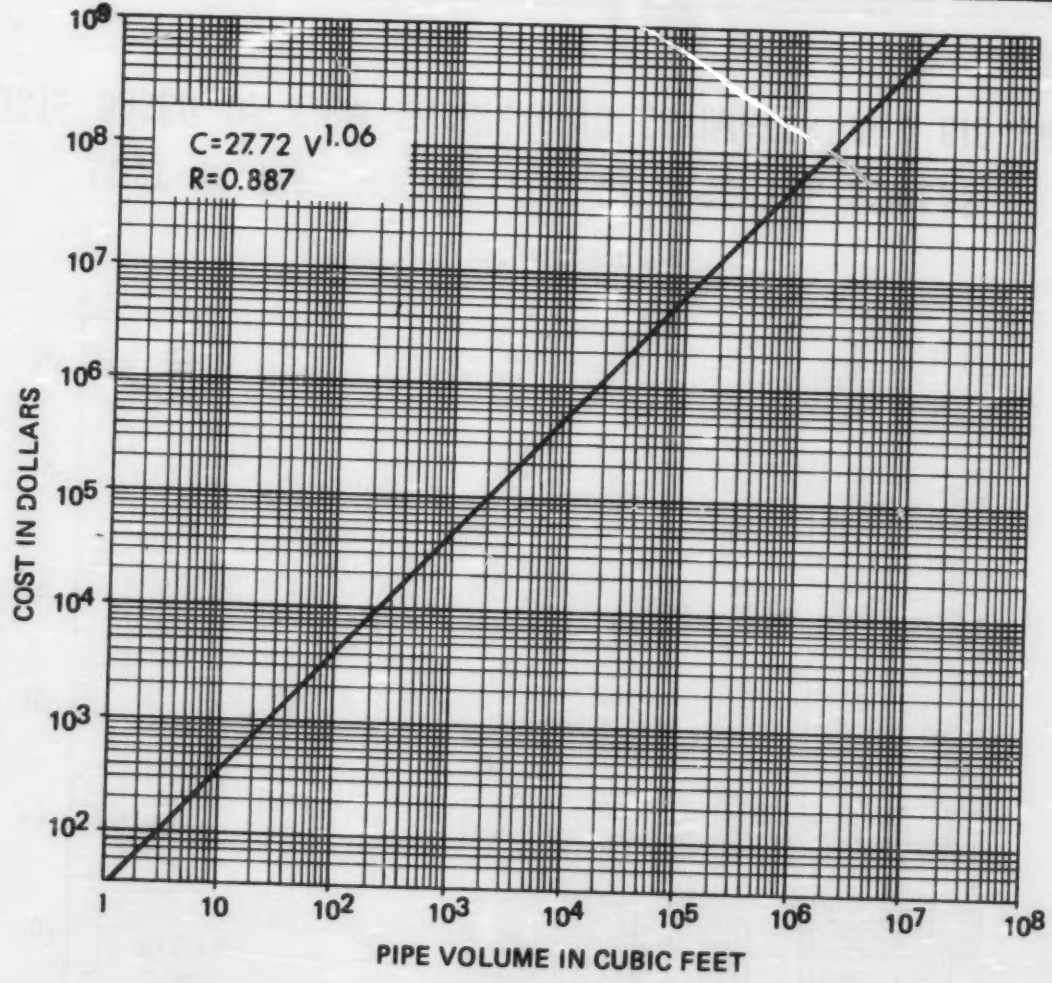


FIGURE 1

COST VS PIPE VOLUME FOR COLLECTOR SEWERS
(COSTS BASED ON FIRM ENGINEERING ESTIMATES AND BID DATA)

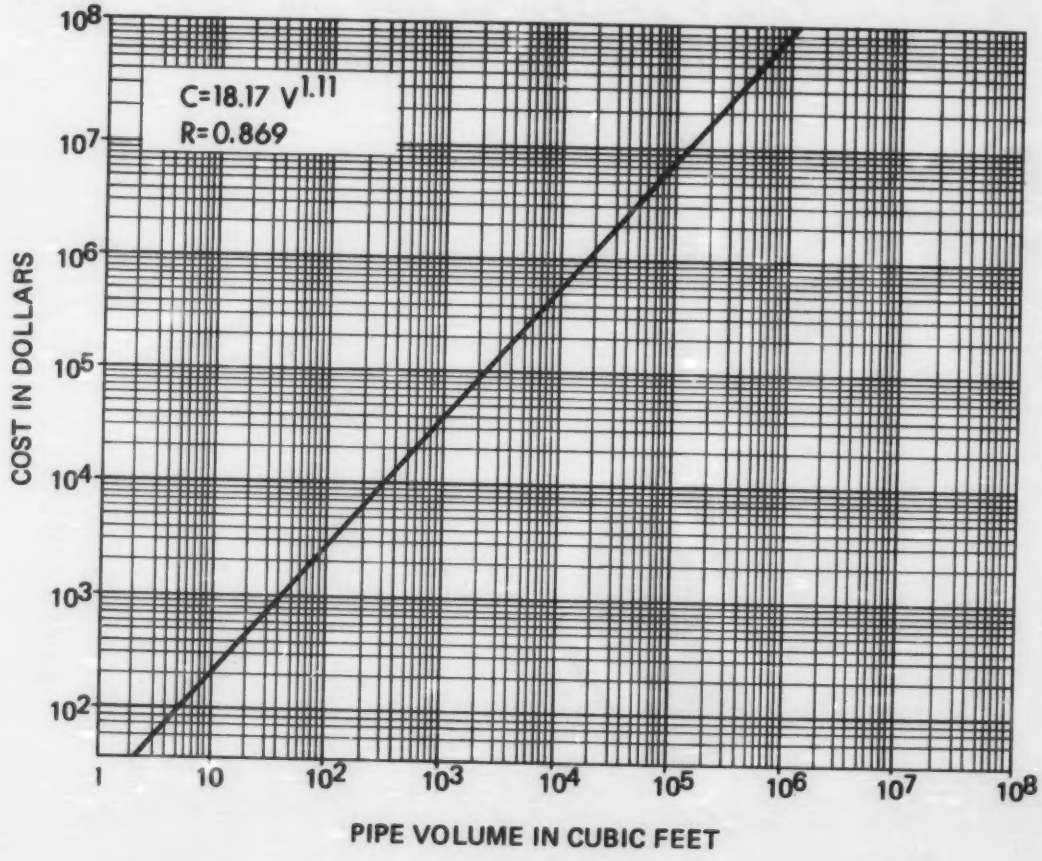


FIGURE 2

COST VS PIPE VOLUME FOR INTERCEPTOR SEWERS
(COSTS BASED ON FIRM ENGINEERING ESTIMATES AND BID DATA)

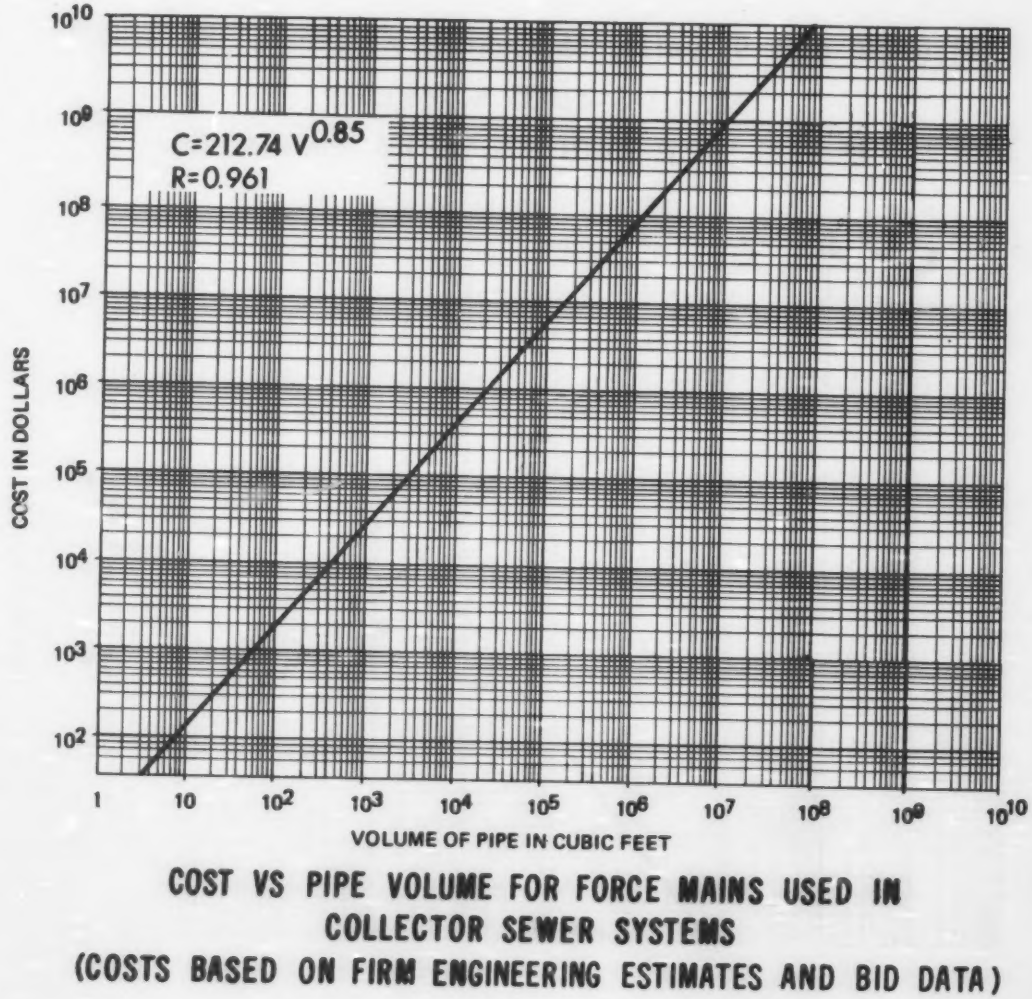
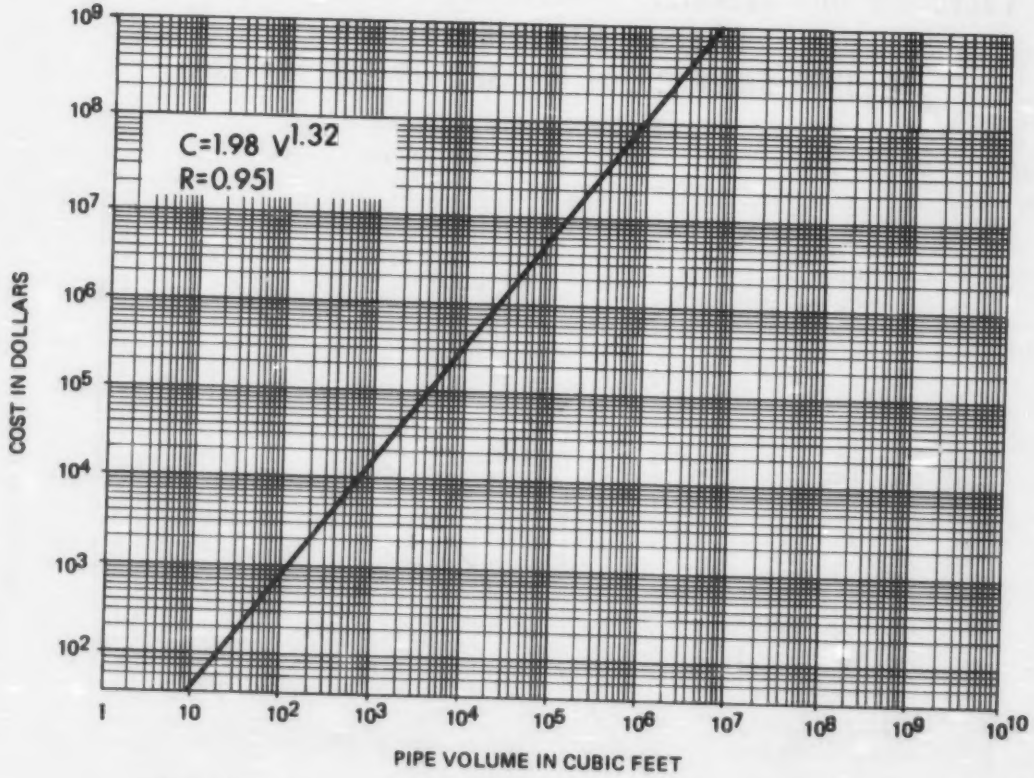


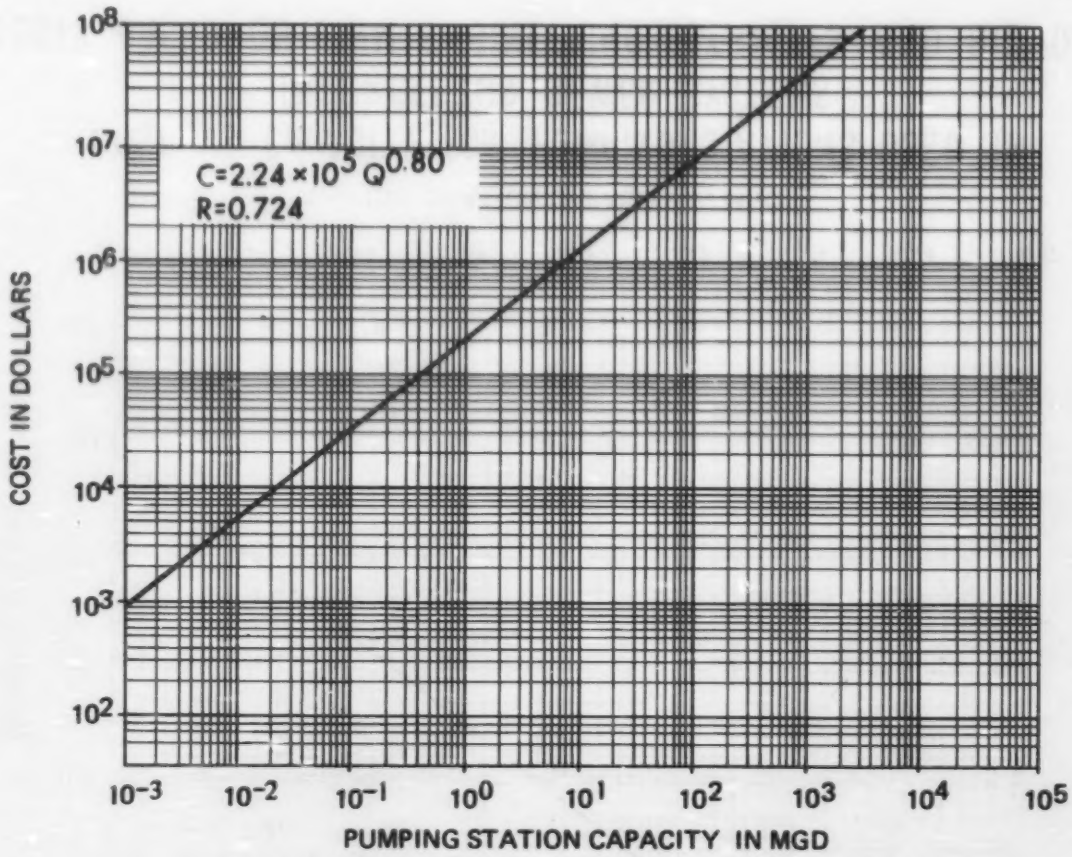
FIGURE 3

COST VS PIPE VOLUME FOR FORCE MAINS USED IN COLLECTOR SEWER SYSTEMS
(COSTS BASED ON FIRM ENGINEERING ESTIMATES AND BID DATA)



COST VS PIPE VOLUME FOR FORCE MAINS USED IN INTECEPTOR SEWER SYSTEMS (COSTS BASED ON FIRM ENGINEERING ESTIMATES AND BID DATA)

FIGURE 4



COST VS CAPACITY FOR PUMPING STATIONS USED IN COLLECTOR SEWER SYSTEMS (COSTS BASED ON FIRM ENGINEERING ESTIMATES AND BID DATA)

F-8

FIGURE 5

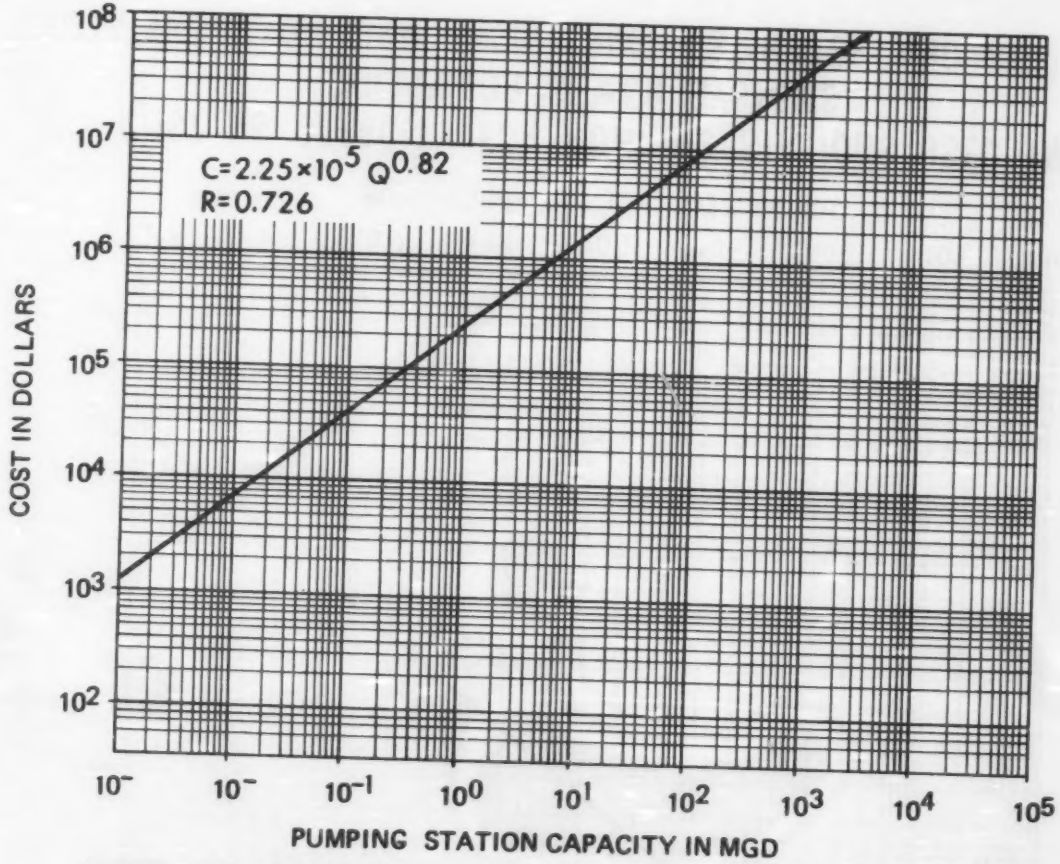


FIGURE 6

COST VS CAPACITY FOR PUMPING STATIONS USED IN INTERCEPTOR SEWER SYSTEMS
(COSTS BASED ON FIRM ENGINEERING ESTIMATES AND BID DATA)

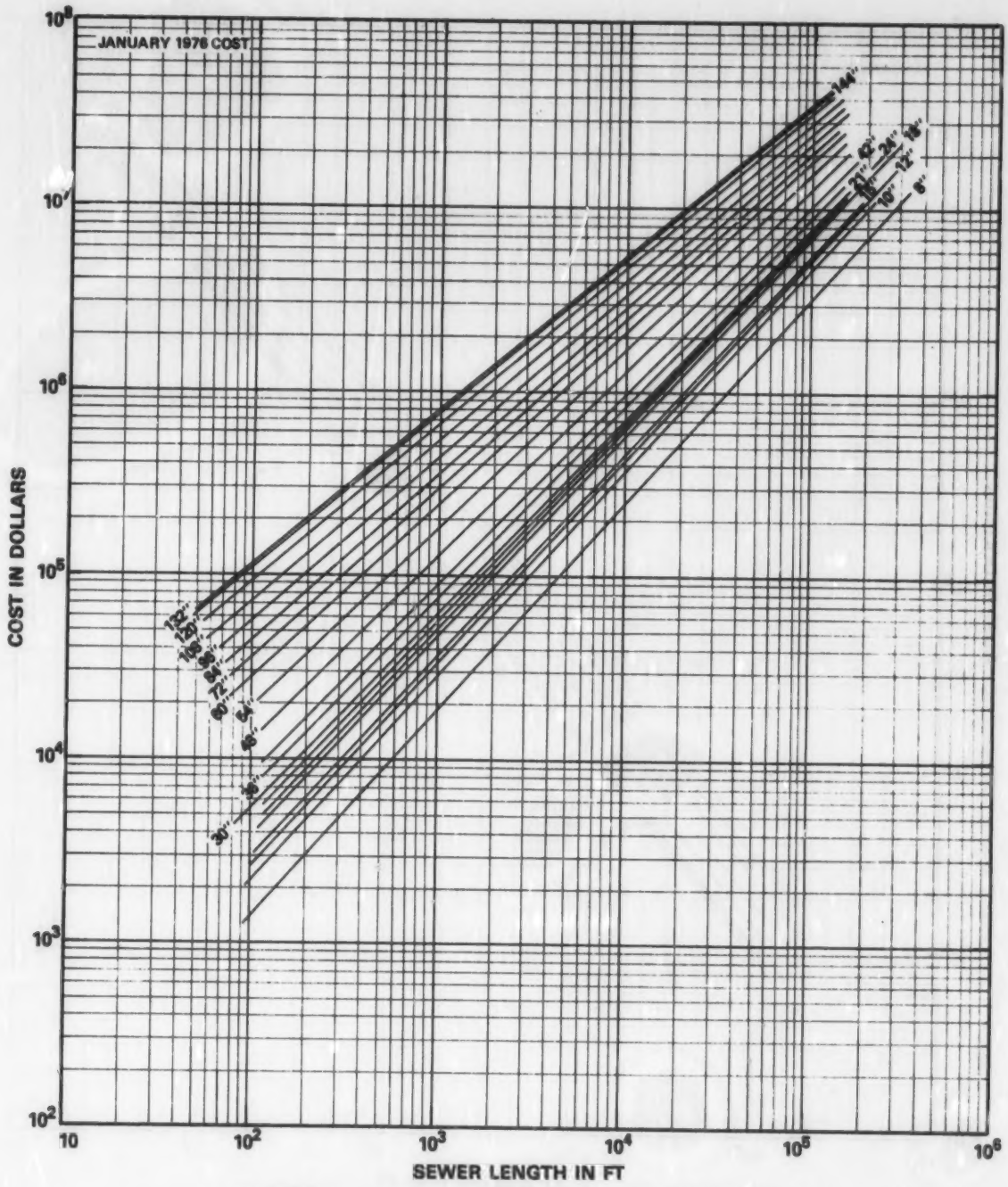


FIGURE 7. COST VS. LENGTH OF GRAVITY SEWERS OF VARIOUS DIAMETERS

FEBRUARY 10, 1977

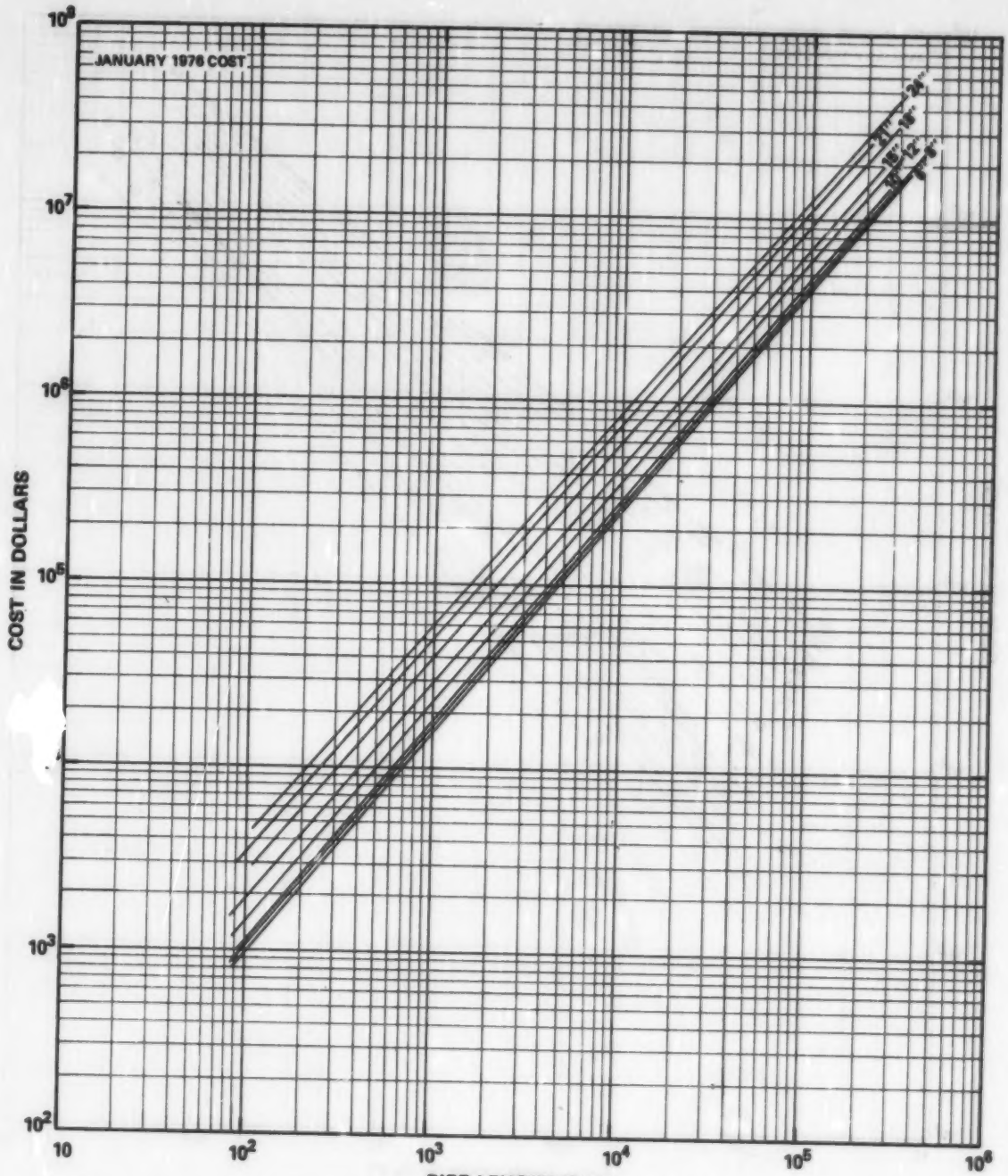


FIGURE 8. COST VS. LENGTH OF FORCE MAINS

FEBRUARY 10, 1977

APPENDIX I

BACKGROUND AND METHODOLOGY USED FOR DATA BASE

The purpose of this Appendix is to present the basic goals, in terms of accuracy and completeness, [illegible] to develop the methodology employed for the collection of data during the 1976 Needs Survey. The actual form utilized, and the level of technical input required to complete these forms, are discussed in Appendix II. Quality control and quality assurance programs were instituted and are briefly described.

A. Conduct of the Survey

Drawing on the experience of the 1973 and 1974 Surveys, EPA and the States formed a working group to determine the strategy for the conduct of the 1976 Survey. Survey goals were identified by the group to be:

1. That the Survey identify and quantify all eligible needs,

2. That the conduct of the Survey be nationally uniform,

3. That the utilization of scarce State and EPA regional personnel and dollar resources required for the Survey be minimized.

The Survey approach taken as a result of these recommendations was:

1. An independent consultant, paid by EPA, would conduct the Survey on a facility-by-facility basis for Categories I-IV. The consultant's personnel were to be based in EPA regional offices, but would visit State and local offices as required to formulate cost estimates and acquire other pertinent information. The engineering firm of Dames and Moore, headquartered in Los Angeles, California, and with company resources sufficient for this large effort, was competitively selected for this task.

2. Survey guidance was formulated in draft by EPA and was circulated to all parties involved in the Survey. After a review period, comments received from the States and regional EPA staffs were incorporated into the final guidelines which were subsequently used on a national basis.

3. National uniformity of estimating procedures was a Survey goal. The cost and construction differences inherent to various sections of the Country were recognized and accommodated. To provide the desired uniformity, all participants of the Survey Team were required to utilize the same approach. This was accomplished by training project staff at the beginning of the Survey. Contractor personnel, one senior individual to be assigned to each Regional EPA office, attended a training/briefing session at the start of the project. These individuals, together with EPA staff and the contractor's senior sanitary engineers, then conducted orientation meetings in EPA Regional offices which were attended by representatives of the States. Logistics, target dates, and individual objections to the guidelines and procedures were discussed and resolved. States were asked only to provide as much investment in personnel for the Survey as they considered prudent; but were invited to participate fully in the formal field Survey work.

4. The next step required the contractor to train a staff in each Region to conduct the actual Survey. Contractor personnel, located in each Regional office, numbered fifty engineers and technicians. The actual field work was started in the early spring of 1976 and was concluded by mid-fall of 1976.

5. All pertinent information available from previous Surveys was made available to the contractor on the basic Survey form (EPA-1). An explanation of this form can be found in Appendix II. The contractor updated and/or confirmed these data from sources within EPA's Regional Offices (NPDES permit and construction grant files), from information supplied by the States, and from individual treatment and collection authorities at the local level. Appropriate costs were estimated, as described in Sections B and C, and the updated or revised form was submitted to the cognizant State for review and approval. Provision was made for the State to make an estimate independent of contractor/EPA figures if agreement between all parties could not be reached.

6. After approval of the estimates by the State the form was reviewed and approved by EPA Regional staff. Throughout this process the contractor provided quality control procedures on all forms.

7. The completed forms were forwarded to a central contractor office where they were each subjected to an independent Quality Assurance procedure. This was done both manually and by computer techniques, the latter being an EPA administered program.

B. Survey Guidance

Participant guidance for the Survey was formulated by EPA, the States, and the consultant, working closely together. This document included the following subjects:

1. Responsibilities of each participant

2. Target dates for project milestones, including the calendar for the Survey, the consultant's contractual obligations, and the States' input and approval procedures.

3. Descriptions of all data sources to be provided to participants, to aid in completion of the Survey.

4. Briefing schedules for participants.

5. Provisions for State and Regional review of consultant's data prior to finalization.

6. Definitions of terms for Needs purposes. Standards were established for definitions of secondary treatment, design year, units of measurement, cost estimating, basis of cost estimate, Survey samples, design flows, and infiltration/inflow reporting.

7. Specific guidelines for completing Survey forms.

8. Descriptions of EPA adjustments to the 1974 Needs data base prior to its use as a starting point in 1976.

9. Cost estimating procedures to be used when more reliable local procedures were not available. These included estimating procedures for treatment costs and new sewers, with factors provided for determination of cost variations in any of twenty-five areas in the vicinity of major cities in the U.S.

10. Interceptor sewer sizing tables.

As a result of meetings and other communications with all of the States, the guidance was supplemented by request to include:

1. "Rules of Thumb" for estimating costs based on best engineering judgement. All of the participants understood that rules of thumb would be used only when better information was not available. In many cases, States presented data which caused the rules of thumb to be modified for local conditions. Examples are:

   a. Per capita domestic and commercial flows were not allowed to exceed 125 gallons per day for treatment unless the locality could substantiate that such higher flows were more cost effective to treat than to correct.

b. Collector and interceptor lengths were limited to twenty feet and one foot per capita, respectively, of unsewered population. Many local exceptions were made to this rule, all based upon details of past experience.

2. A procedure for validation of basis of estimate designations.

3. Additional cost data showing capital costs on a National basis for:

   a. chlorination facilities

   b. pumping stations

   c. filtration systems

   d. waste stabilization ponds

   e. aerated lagoons

4. Procedures for estimating backlog needs for all Categories. Backlog is defined as the cost of those facilities needed on January 1, 1976 to meet the needs of present populations.

5. Instructions for reconciliation of populations.

6. Guidance for estimation of collector sewer costs.

7. Information on grant eligibilities for land costs.

8. Guidance for estimation of I/I analysis costs.

C. Basis of Cost

The quality of all cost estimates used in the Survey was based upon the source documents used for the specific facility. The ranking of these cost estimates, from high to low, was determined by EPA to be:

1. Engineer/Consultant Firm Estimate

2. Engineer Consultant Preliminary Estimate

3. Cost-Effective Analysis (applicable to I/I only)

4. Cost of Previous Comparable Construction

5. EPA Supplied Cost Estimating Procedures

6. Rough Estimate

The quality and completeness of the 1976 Needs Survey data is considered to be significantly better than any previous Survey. A complete analysis of the quality of the cost information can be found in the Cost Report referred to previously.

D. Data Sources

1. The types of data needed in the Survey and the sources used to access this data were many. The major types of data used were:

   a. Population (present and 1990)

   b. Total flow (average, current design and projected 1990 design)

   c. Industrial flow (average, current design and projected 1990 design)

   d. Biological oxygen demand, influent and effluent, (average, current design and projected 1990 design)

   e. Nitrogen and phosphorus removal requirements (average, current design and projected 1990 design)

   f. Treatment methods

   g. Sludge handling treatment and disposal methods

   h. Level of treatment required

2. The sources of these data were:

   a. 1974 Needs Survey data

   b. NPDES applications and permits

   c. Grant application files

   d. Grant files and Grant Information Control System data

   e. Facility and/or Regional Plans (201 and 208 plans)

   f. Other engineering plans or reports

   g. State Water Quality Standards

APPENDIX II

SURVEY FORM

The 1974 form, a 37 page booklet, was revised to one page for use in the 1976 Survey. The 1974 Data of Record for each facility included in the 1974 Survey was generated by computer on the new 1976 Survey form. Once the revised cost estimates were recorded on Survey forms for each facility, copies of the completed forms were provided for all parties participating in the Survey. These forms were then used to record the updated 1976 Needs Survey figures.

Census data for 1975 and 1990 populations, as modified by formally granted exceptions, were used as State ceilings; State population totals were not permitted to exceed these ceilings.

A copy of the Form EPA-1 used for this Survey is shown as Exhibit A. It can be seen that each form contains a great deal of data for both treatment plants and sewers. By use of an elaborate coding system (Exhibit B) not only could all pertinent physical and cost data be entered for each facility, but such coding also provides for systematic checking by computer for accuracy and completeness.

Listed below is a brief explanation of each item in the 1976 Needs Survey form EPA-1. Data of Record were preprinted in the white portions of the forms; corrections and/or revisions were entered in the shaded portions.

1. NEEDS SURVEY NUMBER

This is a nine digit number. The first two digits are a coded number from the Federal Information Processing Standard for Designating States and Outlying Areas of the United States (FIPS-5), and designates a particular State. The next four numbers are assigned sequentially by each State agency. The last three numbers are assigned by the authority to the facility.

2. FACILITY NAME

The official name of the facility which is legally used to identify it.

3. AUTHORITY NAME

The official name of the authority which is legally used to identify it.

4. NPDES NUMBER

The National Pollutant Discharge Elimination System permit number, assigned through the EPA permit program.

5. BASIN NUMBER

This four digit number shows the EPA major/minor basin codes.

6. 245 NUMBER

This thirteen digit number is the Municipal Waste Facility Inventory number.

7. SAMPLE

If this box is checked, the facility was part of the sample used by some States for communities of less than 10,000 population outside Standard Metropolitan Statistical Areas (SMSA's).

8. FACILITY LOCATION

The State location is the same two digit FIPS-5 number used in the authority number. The County location is based on the FIPS-6 codes. The Place location number is derived from the "Geographic Identification Place Scheme" developed by the Census Bureau, and is a four digit number.

9. CONGRESSIONAL DISTRICT

The number of the Congressional District in which the facility was located in 1976.

10. SUBMISSION CODE

This is a one digit number which indicates whether the facility needs have had no change since the 1974 Survey, were not reported, or have been changed.

11. CITY

The City in which the facility is located.

12. COUNTY

The County in which the facility is located.

13. ZIP CODE

The offical Post Office Zip Code of the facility.

14a. FACILITY STATUS

This shows by a one digit code whether the facility is currently in operation or not in operation. Facilities not in operation are usually either currently proposed or under construction.

b. NATURE OF FACILITY

This is a one digit code which stands for the type of facility.

c. CONSTRUCTION GRANT STATUS

This one digit code shows if there is a construction grant approved or pending, or if there are no applicable grants.

d. PROJECTED CHANGE

This one digit code shows projected physical changes for the facilty, i.e., if the facility will be enlarged, upgraded, replaced, abandoned, etc.

e. ABANDONMENT DATE

The appropriate date is filled in only if the facility will be abandoned.

15. SUMMARY OF CATEGORY NEEDS

This section is used to record the costs for Categories I-IVB. Column (a) is for the EPA assessment, column (b) is for the State estimate, and column (c) is the portion required to satisfy "backlog" facility requirements. "Backlog" refers to facility requirements that are established on the basis of current rather than 1990 population. The basis of estimate in the last column is a one digit code which specifies the basis of the cost estimation.

16. FACILITY POPULATION

This section shows the population which receives treatment and/or collection from the facility. Both are broken down by present resident population, present non-resident population, projected resident population, projected non-resident population.

17. NEED FOR NEW COLLECTORS, INTERCEPTORS, FORCE MAINS, AND PUMPING STATIONS

This section lists codes for new collectors, interceptors, force mains, and pumping stations, and their costs. The diameter of pipe is in inches, the length in feet, and the capacity is in millions of gallons per day (MGD). These have been converted in the technical summaries to metric units.

18. DISPOSAL OF LIQUID EFFLUENTS

"Disp," "Use," and "Chng" are all one digit codes indicating the type of disposal, whether the facility is now in use, under construction, etc., and whether or not there will be a physical change, i.e., enlarge, upgrade, etc.

19. REQUIRED INFILTRATION/INFLOW CORRECTIVE ACTION

"Code" is a one digit number showing the type of corrective action. "Basis" stands for the Basis of Estimate, referred to previously.

20. ESTIMATED INFILTRATION/INFLOW COMPONENT

This number is the total flow component (MGD) due to infiltration/inflow.

21. MAJOR REHABILITATION/REPLACEMENT REQUIRED

"Code" is a one digit code standing for type of corrective action. "Basis" is the Basis of Estimate.

22. DO WASTEWATERS ORIGINATE IN COMMUNITIES EXISTING BEFORE OCTOBER 18, 1972?

This is self-explanatory and is answered by a "yes" or "no."

23. 1972 COLLECTION POPULATION

This figure is the actual 1972 population requiring new collector sewers.

24. FLOWS, CONCENTRATION, AND REMOVAL RATES

This section is for monthly average flow or concentration figures in terms of the existing rate, the present design rate, and projected design rate for the following Categories:

1. total flow in million gallons per day (MGD)

2. total industrial flow in million gallons per day (MGD)

3. domestic flow per capita in gallons per capita per day (gpcd)

Below these figures, influent and effluent concentrations are shown for five-day Biological Oxygen Demand (milligrams per liter), suspended solids (milligrams per liter), phosphorus (milligrams per liter), total kjeldehl nitrogen (milligrams per liter), total nitrogen (milligrams per liter), and any others.

25. DOES DISCHARGE MEET SECONDARY?

Whether or not the discharge currently meets secondary treatment standards is answered by a "yes" or "no."

26. WILL DISCHARGE MEET SECONDARY BY JULY 1, 1977?

Whether or not the discharge will meet secondary treatment by July 1, 1977 is answered by a "yes" or "no."

27. IS REQUIRED TREATMENT LEVEL MORE STRINGENT THAN SECONDARY?
28. REASON:

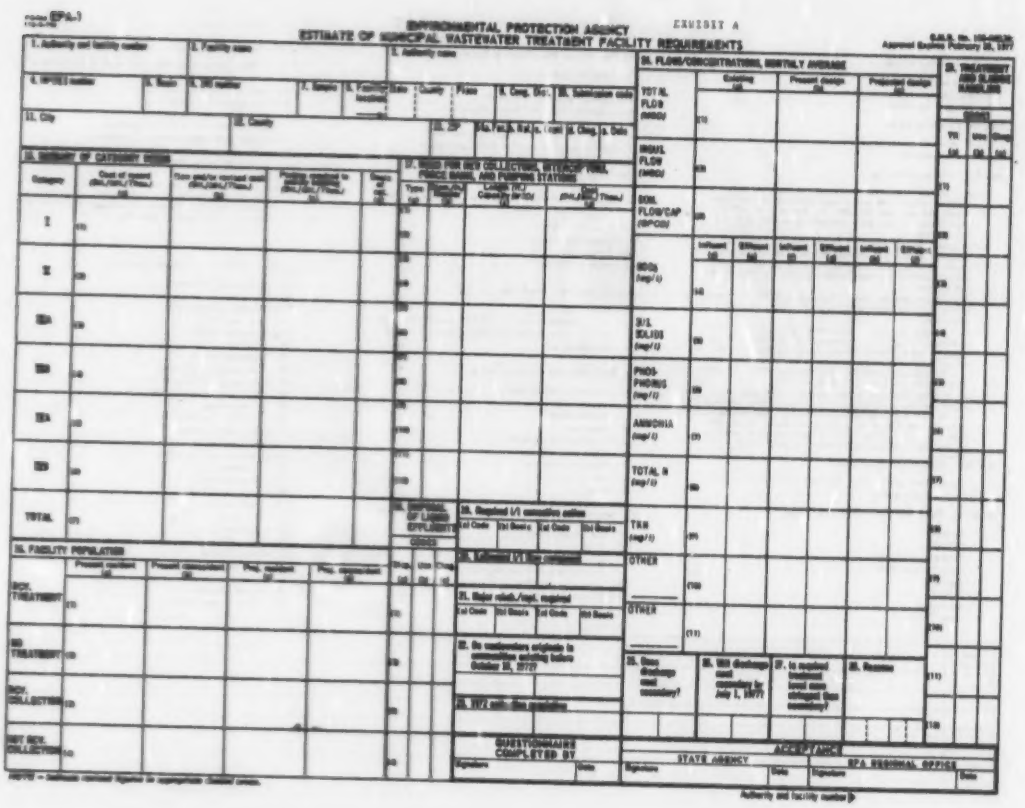
Whether or not the required treatment level is more stringent than secondary treatment standards is answered by a "yes" or "no." If yes, a one digit code is entered in Number 28, Reasons.

29. TREATMENT AND SLUDGE HANDLING

There are three columns in this section. The first column is for type of treatment and sludge handling (unit process), the second column is for the current use, and the third column shows projected change.

Reproduced from best available copy.

EXHIBIT A



ENVIRONMENTAL PROTECTION AGENCY
ESTIMATE OF MUNICIPAL WASTEWATER TREATMENT FACILITY REQUIREMENTS

1. Authority and facility number
2. Facility name
3. Authority name
4. NPDES number
5. Basin
6. SID number
7. Region
8. Facility location: State, County, Place
9. Cong. Dist.
10. Submission code
11. City
12. County
13. ZIP
14. Fed. Reg. cite
15. Cong. date
16. Date

III. SUMMARY OF CATEGORY NEEDS

Category	Cost of needs ($MILLION)	Time yet to correct need ($MILLION-Years)	Population needing to be served ($MILLION)	Needs of non-municipal facilities
I	(1)			
II	(2)			
IIIA	(3)			
IIIB	(4)			
IIIA	(5)			
IIIB	(6)			
TOTAL	(7)			

IV. NEED FOR NEW COLLECTION, INTERCEPTOR, FORCE MAINS, AND PUMPING STATIONS

Type	Needed (Y or N)	Capacity (MGD)	Cost ($MILLION)
(8)	(9)	(10)	(11)
(12)			
(13)			
(14)			
(15)			
(16)			
(17)			

V. NEED FOR CORRECTION OF EXCESSIVE INFILTRATION/INFLOW

	Needed (Y or N)	Capacity (MGD)	Cost ($MILLION)
	(18)	(19)	(20)

VI. DISPOSAL OF TREATED EFFLUENTS

	Needed (Y or N)	Capacity (MGD)	Cost ($MILLION)
	(21)	(22)	(23)

VII. FACILITY POPULATION

	Present significant	Present unsewered	Proj. significant (20 yr)	Proj. unsewered (20 yr)
SEC. TREATMENT	(24)			
HO TREATMENT	(25)			
SEW. COLLECTION	(26)			
INFT SEW. COLLECTION	(27)			

NOTE – Indicate decimal figures in appropriate (blank) areas.

VIII. NEEDS

	Needed (Y or N)	Capacity (MGD)	Cost ($MILLION)
	(28)	(29)	(30)

28. Required I/I correction action
1st Grade | 2nd Grade | 3rd Grade | 4th Grade

29. I/I [illegible] completed

31. Major need(s) not reported
1st Grade | 2nd Grade | 3rd Grade | 4th Grade

32. Do wastewaters originate in communities exceeding before October 30, 1972?

33. 1972 with this population

QUESTIONNAIRE COMPLETED BY
Signature | Date

IX. FLOWS/CONCENTRATIONS, MONTHLY AVERAGE

	Existing (a)	Present design (b)	Projected design (c)
TOTAL FLOW (MGD)	(31)		
INDUS. FLOW (MGD)	(32)		
DOM. FLOW/CAP (GPCD)	(33)		

	Influent (a)	Effluent (b)	Influent (c)	Effluent (d)	Influent (e)	Effluent (f)
BOD5 (mg/l)	(34)					
S/S SOLIDS (mg/l)	(35)					
PHOSPHORUS (mg/l)	(36)					
AMMONIA (mg/l)	(37)					
TOTAL N (mg/l)	(38)					
TSS (mg/l)	(39)					
OTHER _____	(40)					
OTHER _____	(41)					

35. Does discharge meet secondary?	36. Will discharge meet secondary by July 1, 1977?	37. Is required treatment level more stringent than secondary?	38. Reserve
			(42)

X. TREATMENT AND FLOWING MAINS (MI)

	Total	Unsewered	Flowing
	(43)	(44)	(45)
	(46)		
	(47)		
	(48)		
	(49)		
	(50)		
	(51)		
	(52)		
	(53)		

SIGNATURE
STATE AGENCY: Signature | Date
EPA REGIONAL OFFICE: Signature | Date

Authority and facility number ▶

CODE REFERENCE CHART

Item 10 – Interstate Code

1 – No change from 1974
2 – Facility not reported in 1974
3 – Change from 1974

Item 14a – Facility Status

1 – In operation
2 – Not in operation

Item 14b – Nature of Facility

1 – A complete wastewater treatment system (includes a treatment plant, with associated collector and/or interceptor sewers, and methods for disposal of effluent, under control of the same treatment authority) with combined sewers.
2 – A complete wastewater treatment system (includes a treatment plant, with associated collector and/or interceptor sewers, and methods for disposal of effluent, under control of the same treatment authority) with separate sewers.
3 – A separate treatment plant. (The sewers which discharge to this plant are under the control of one or more different authorities.)
4 – A separate municipal wastewater collection system. (Includes one or more connected collector and/or interceptor sewers, force mains, pumping stations, etc., which either discharge without treatment or discharge to a facility controlled by a different authority. Do not include combined sewers or storm sewers.)
5 – A separate combined sewer system. (Includes one or more interconnected sewers which carry both sanitary wastewaters and storm waters, and which either discharge without treatment or to a facility operated by another authority. If facility includes both separate sanitary sewers and combined sewers, report as combined.)
6 – Other

Item 14c – Construction Grant Status

1 – Construction grant funds approved or pending in 1974.
2 – No applicable grants

Items 14d, 16c, and 29c – Proposed Change

1 – Enlarge
2 – Upgrade
3 – Enlarge and upgrade
4 – Install in new plant
5 – Replace
6 – Abandon
7 – No change
8 – Other

Items 15d, 19b and 21b – Basis of Estimate

1 – State certification
2 – Analysis completed
3 – Evaluation survey completed
4 – Engineer/consultant firm estimate
5 – Cost of previous comparable construction
6 – Engineer/consultant preliminary estimate
7 – EPA – supplied cost estimating procedures
8 – Cost effective analysis
9 – Rough estimate

Item 17a – New Collectors, Interceptors, Force Mains, and Pumping Stations

CS – Collector sewers
IS – Interceptor sewers
FM – Force Main
PS – Pumping Station

Items 18b and 29b – Use Codes

1 – Now in use
2 – Under construction or provided for in approved grant
3 – Required, but not yet approved or funded
4 – Not applicable

Item 19a – Disposal of Liquid Effluents

1 – Outfall to surface waters
2 – Ocean outfall
3 – Holding pond
4 – Deep well
5 – Ground water recharge
6 – Other land disposal
7 – Recycling and reuse
8 – Septic tank field
9 – Other

Item 19A (1/2) and Item 21A (Major Rehab.) Corrective Action

1 – Not known at this time
2 – None
3 – Seal off sewer lines
4 – Replace/reline sewer sections
5 – Change/cross flow routing system
6 – Provide flow equalization
7 – Other corrective actions

EXHIBIT 8

Item 25 – Reasons for Treatment More Stringent than Secondary

0 – A water quality plan which has been approved by EPA
1 – Order of State Court
2 – Order of Federal Court
3 – State permit or license
4 – NPDES permit or license
5 – State enforcement order or proceeding
6 – Federal enforcement order or proceeding
7 – Voluntary agreement which includes a schedule of completions or improvements
8 – Other
9 – A certification by the State that the body of water receiving this discharge is water quality dependent, and that more stringent treatment is needed to meet Federally-approved water quality standards for dissolved oxygen or nutrients.

Item 29a – Treatment and Sludge Handling

01 – Preliminary treatment
02 – Pumping
03 – Primary sedimentation
04 – Trickling filter
05 – Activated sludge
06 – Filtration
07 – Activated carbon
08 – Two stage tertiary lime
09 – Biological nitrification
10 – Biological denitrification
11 – Ion exchange
12 – Breakpoint chlorination
13 – Ammonia stripping
14 – Disinfection
15 – Land treatment of effluent
16 – Oxidation ponds
17 – Other treatment
30 – Anaerobic digestion
31 – Heat treatment
32 – Air drying
33 – Dewatering
34 – Incineration
35 – Recalcination
36 – Land fill
37 – Land spreading of sludge
38 – Ocean dumping
39 – Other sludge handling

Item reference	Comments	Item reference	Comments

★ U.S. Government Printing Office: 1977-778-742/154 Region 8